CHILTON'S JANUARY 1989

CCJ

COMMERCIAL CARRIER JOURNAL

ASTA Heavy Duty Distributor Directory

GETTING READY FOR TL-LOCK

ALSO: LIFE CYCLE COSTING
MIXING TL/LTL FOR PROFIT

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COMMERCIAL CARRIER JOURNAL

VOLUME 146 NUMBER 1 JANUARY 1989

TABLE OF CONTENTS

FEATURES	GETTING READY FOR ANTI-LOCK What you should know about anti-lock before buying	58
	VEHICLE LIFE CYCLE COSTING How to tell when it's time to replace old vehicles	64
	MIXING TL AND LTL FOR PROFIT Regional fleet adopts innovative approach	67
	ASIA HEAVY-DUTY SERVICE DIRECTORY Features supplier lines and hours of operation	71
COLUMNS	Editorial / This time, Ryder's might is right	9
	Washington Report/ Final drug testing rules issues	41
	Business Side/ Report reveals updated cost data	45
	Safety / OSHA's long history of incompetence	55
	Maintenance-Technology / CH600 to replace R model	115
DEPARTMENTS	Up Front	16
	Industry Watch	32
	Coming Events	42
	Truck Talk Postcard	53
	Classified Advertising	139
	Advertisers' Index	141
PRODUCTS	New Product And Services	121
	Publications	138
	SideRoads	142
POSTCARDS	Brake Book and Reader Service Cards	143
	Subscription Cards	145

Page 58

Page 67

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IN THIS ISSUE

This issue was to include an impact analysis of the Federal Highway Administration's ruling (effective Nov. 15, 1989) that rescinded interstate fleets' exemption from Federal Motor Carrier Safety Regulations when they operate in commercial zones.

Those plans were short-circuited on Oct. 21 by the vaguely-worded Truck and Bus Safety and Regulatory Act that basically mirrored FHWA's rule, as reported in the December 1988 edition of CCJ. However, the new law modified provisions such as grandfathering and physical qualifications of drivers.

Since the legislation requires FHWA to revise its final rule, confusion prevails. When the dust clears, CCJ will publish an article on the impact of repealing commercial zone exemptions. □

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U.S. Supreme Court will review Arkansas refunds

The U.S. Supreme Court has agreed to decide if the state of Arkansas must refund all money collected through a tax declared unconstitutional by an Arkansas court. In March, the state court declared Arkansas' 5¢ per mile Highway Use Equalization tax unconstitutional and awarded a refund of taxes that had been held in escrow pending a final outcome of the litigation. The American Trucking Associations is seeking a retroactive refund of all the money collected since the tax was first levied in 1983.

New law relieves users of nontaxable diesel fuel

The Technical and Miscellaneous Revenue Act of 1988 provides relief for users of nontaxable diesel fuel. Effective April 1, 1988, all users were required to buy diesel fuel tax-paid and then apply for a refund on tax-exempt consumption. Now, users who buy from a qualified producer or wholesale-distributor (but not a retailer) will be able to buy fuel tax-free, beginning Jan. 1, 1989. The Treasury may require registration and reporting by both buyers and sellers. Buyers who purchase exempt fuel tax-paid will be able to file for refunds after accumulating $750 of overpayments in one or more quarters. Refunds for tax paid on exempt fuel from April 1 to Dec. 31, 1988, will be paid with interest if no refund or credit has already been claimed.

New division established by Radiator Specialty

Radiator Specialty Co. announced the establishment of a new operating division named the Truck and Heavy-Duty Division. The unit will manufacture and market a product line of chemicals, lubricants, safety devices and hoses for the fleet and owner-operator over-the-road and off-road markets.

Survey: Owner operators rank dealers and vehicles

A recent survey by Associates Commercial Corp. asked independent truckers about their relations with truck dealers. Of the truckers who responded to the survey, 25.1% mentioned a well-stocked parts inventory as being the most important reason for patronizing a truck dealership. Dealers' maintenance facilities (23.8%) and easiness to work with (13.2%) were the next most popular reasons. Approximately 33% of the truckers responding to the survey mentioned substandard mechanics or maintenance as a negative aspect of their experiences with truck dealers. Vehicle price was also a cause of friction (16.7%), and 12.1% cited unfulfilled warranty promises. According to the data, Western Star, Mack, Peterbilt and Marmon dealers were the most successful in avoiding troublesome experiences with their customers. Here's how truckers rated both the trucks and the dealers on a scale from 1 to 10 (10 being the highest):

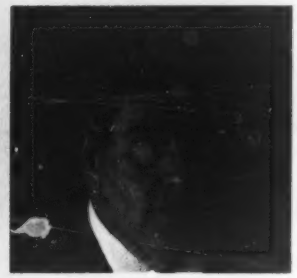
Nameplate	Dealership Rating	Vehicle Rating
Marmon	8.2	8.4
Western Star	6.9	7.7
Peterbilt	6.7	7.2
International	6.6	6.7
Kenworth	6.5	6.7
Mack	6.4	6.9
Freightliner	6.2	6.8
Volvo GM	6.1	7.0
Ford	5.3	5.8

Tire manufacturers announce global expansion plan

Bridgestone Corp. and The Firestone Tire & Rubber Co. announced they will initiate a global expansion plan that calls for approximately $1.5 billion in capital expenditures over about three years. The funds will be invested worldwide in Firestone's tire, diversified products and MasterCare automotive service businesses. Among key aspects of the plan are: to enhance product quality and productivity; expand capacity at Firestone Tire & Rubber plants in North America, Europe and Central and South America; and produce Bridgestone brand tires at Firestone plants in North America and Europe. In North America, Bridgestone tires will be sold through MasterCare outlets.

Manufacturers of pressure washing systems merge

L & A Products Inc., St. Paul, Minn., and Consolidated Chemex Corp., Cinnaminson, N.J., both manufacturers of pressure washing systems and equipment, have merged. They will operate as independent divisions under the new corporate name of Greylock Industries Inc., with headquarters in Cinnaminson. Projected annual sales of the new company are $15 million. Both divisions will retain their distributors, which number over 600 in the U.S. and Canada.



Report reveals updated linehaul cost data

By PARRY DESMOND Executive Editor 215-964-4529

It cost a Class I for-hire carrier 105.02¢ per mile to operate a tractor-trailer over the road in 1987. Of that total, the variable cost was 79.34¢ per mile, and the fixed and overhead costs were 25.68¢ a mile.

According to Ron Roth, the director of the American Trucking Associations' Statistical Analysis Department, those costs were derived from annual reports submitted to the Interstate Commerce Commission by 400 general freight carriers in 1988. Selection of the 54 general freight carriers included in the study was based on a minimum of $10 million in annual revenues. And, in order to focus on "identifiable specific costs," the analysis only included data from fleets with no more than 2% of total miles driven by owner operators.

Driver wages almost half of total

The study noted that 39.23¢ or 49% of the total variable costs per mile was for driver wages.

A breakdown of the non-driver variable costs—totaling 40.11¢ per mile—were 15.40¢ for fuel, oil, lubricants and coolants; 9.94¢ for vehicle maintenance; 9.89¢ for book depreciation; 2.43¢ for tires and tubes.

Significant fixed and overhead costs per mile, which totaled 25.68¢, were: officers' and supervisors' salaries, 2.52¢; labor other than drivers and repairs, 1.20¢; fringes, 13.22¢; general supplies and expenses, 1.27¢; taxes and licenses (other than fuel and oil), 3.01¢; insurance, 2.75¢.

The chart (see box on this page) that breaks down carriers' 1987 linehaul costs based on their annual revenues grouping, shows there was little difference in variable costs. The spread between the total linehaul costs for high cost group (107.49¢) was only 5.67¢ per mile greater than the low cost group (101.82¢).

The cents-per-mile spread of variable costs between the high- and low-cost groups was even less—4.56¢.

While larger carriers had lower variable costs, higher average overhead offset that advantage.

Linehaul only a third of all costs

"Linehaul costs are but one component of a carrier's total costs, especially in general freight operations where many thousands of small shipments are handled daily," warns Roth. In 1987, linehaul costs represented only one-third of all general freight carrier costs.

In addition to linehaul costs, carriers spent a total of 62.95¢ per mile on operating costs. Those per mile costs include: pick up and delivery, 23.74¢; terminal, 17.23¢; platform, 8.49¢; traffic and sales, 4.50¢; general and administrative, 4.35¢; billing and collecting, 2.34¢; maintenance, 1.40¢; insurance and safety, 0.90¢.

Thus when you see the $3.29 per-mile revenue for the 54 general freight carriers included in the ATA study, the revenue covers much more than linehaul costs.

Continued

'87 Tractor-Trailer Linehaul Costs By Revenue Size Groupings

	Carriers with revenues ($ million) of		
	$100 or more	$50 - $100	$10 - $50
	Cost per mile (¢)		
Driver wages	39.96	32.79	36.42
Vehicle Repair Wages	5.05	5.22	5.32
Vehicle Parts	3.20	3.84	4.05
Parts & Repair Wages	8.24	9.06	9.37
Outside Maintenance	1.47	2.01	2.49
Total Maintenance	9.72	11.07	11.86
Tires & Tubes	2.29	3.47	3.39
Other Operating Expenses	2.45	3.47	3.39
Fuel Expense	9.69	11.17	11.47
Fuel & Fuel Taxes	14.81	16.99	17.01
Oil, Lube & Coolant	0.30	0.35	0.33
Fuel, Fuel Tax & Oil	15.11	17.35	17.34
Depreciation	9.42	13.31	12.66
Subtotal: Variable Cost Categories	78.95	80.78	83.51
Subtotal: Overhead & Fixed Costs	26.15	21.04	23.98
Total Linehaul Costs	105.10	101.82	107.49

Roth cautioned that "no single figure [in his report] represents an absolute" because the trucking industry is so diverse. "Operating costs for a dry freight van can differ significantly from a tanker, a reefer or an auto rack," noted Roth. And even when vocationally comparable carriers use the same type equipment, costs can vary because of factors such as driver wages, equipment age, maintenance and purchasing practices for fuel, parts, tires and outside services, fleet location and operating territory, climate, length of haul, taxes, licenses and insurance. "In short, the figures in this analysis are averages and shouldn't be used to represent any individual carrier's over-the-road costs," concluded Roth.

Comparison of TL share prices

Listed below is a comparison of percentage changes in share prices of publicly-traded truckload carriers for the first 10 months of 1988, based on data supplied by Morgan Keegan & Co., the Memphis, Tenn.-based investment firm:

Cannon Express	76.5%
Heartland Express	50.9%
J.B. Hunt Transport	49.2%
Werner Enterprises	17.7%
M.S. Carriers	14.5%
S & P 500 Index	*12.9%*
Marten Transport	(7.7%)
MNX Inc.	(9.5%)
P.A.M. Transport	(10.7%)
KLLM Transport	(11.5%)
Builders Transport	(15.6%)
Freymiller Trucking	(27.3%)
Country Wide	(36.4%)
Circle Express	(55.9%)

Shipper-carrier partnerships analyzed

Following federal deregulation of the motor carrier industry in 1980, shippers were giddy with carrier selection options and opportunities to cut costs drastically. But some shippers were caught with deregulatory pants down when low-cost, for-hire fleets with 48-state authority performed poorly or went belly-up.

In addition to coping with the uncertainty of whether carriers could pick up and deliver freight on a scheduled basis, shippers eventually realized they were spending an incredible amount of time negotiating rates and managing additional carriers.

According to the thesis Marcia L. Santaga wrote in 1987 for a master of administrative science degree from the University of Wisconsin, Green Bay, the problems noted above have generated a trend toward more committed relationships between carriers and shippers to improve productivity and efficiency. Shippers now realize high-quality service, in addition to competitive rates, is a critical factor in choosing a carrier. As a result, Santaga claimed, shippers have begun to establish long-term partnerships with a reduced number of carriers.

In a partnership, "a carrier becomes an integral aspect of the distribution process, gets a high market share of the shipper's total freight, receives a competitive rate, and does everything in its power to meet the needs of the shipper," wrote Santaga.

And a partnership "can enable the carrier to gain a cost advantage over competitors," she wrote in "Determination of Factors Which Influence Truckload Carrier-Shipper Partnership Relationships."

Santaga's research effort, sponsored by Schneider National, the truckload carrier based in Green Bay, Wisc., was based on a random sample (200) of 1,000 leading U.S. shippers.

At least half of the companies surveyed had at least eight plants—typically located in medium-size cities with two- or four-lane highways nearby—and more than 400 employees working at each location. And more than 450 full truckloads were hauled out of those facilities monthly.

Based on her research, Santaga determined that partnerships have caused shippers to establish better relations with motor carriers in the ways noted below:

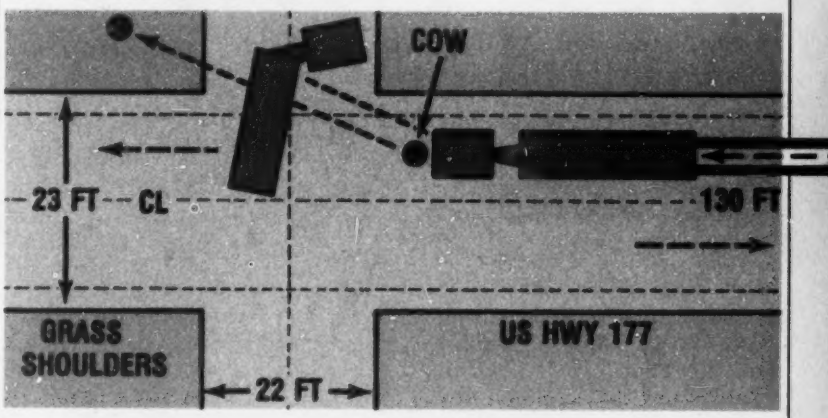
- 89% have daily communication with carriers;
- 11% have committees that include carrier representatives.
- 34% share competitors' rates with carriers;
- 69% routinely exchange information on company philosophies, management styles, or objectives with carriers;
- 62% share cost information with carriers;
- 85% have visited carriers' places of business;
- about 50% exchange formal training or presentations with carriers;
- 20% are committed to giving carriers a specified percentage of business;
- less than 50% require driver assistance in loading and unloading, stopoffs, or pallet exchange or return;
- 52% pay premiums so less desirable loads are delivered;
- 96% depend on top carriers to handle less-than-desirable loads;
- 46% have long-term contracts—at least a one-year commitment—with carriers;
- 22% have electronic data interchange (EDI) capability;
- 6% have employees who work exclusively with their carrier(s);
- more than 60% use at least one of the following: computerized rating, auditing or planning; computerized decision support systems; just-in-time delivery;
- 42% use only one or two new carriers in the past six months;
- 60% give 25% or less of their freight to one preferred carrier; 30% give 26%-50%; 9% give more than 50% to one fleet.

Circle 18 on Inquiry Card→

DOT fines issued in '88

- **Coles Express,** Bangor, Me., paid $4,000 for: using a driver without a medical examination; requiring/permitting part-time drivers to operate without obtaining signed statements regarding duty hours for the preceding seven days.
- **North American Van Lines,** Ft. Wayne, Ind., paid $8,000 for: requiring/permitting drivers to make false entries upon a record of duty status; failing to require drivers to forward the original of the record of duty status within 13 days of completion.
- **Midwest Transport,** Wilmar, Minn., paid $8,500 for: requiring/permitting drivers to operate more than 10 hours following 8 consecutive hours off duty; requiring/permitting drivers to operate after having been on duty more than 70 hours in eight consecutive days.
- **Mitchell Transport,** Cleveland, Oh., paid $4,000 for: requiring/permitting drivers to make false entries upon a record of duty status.
- **Nu-Car Carriers,** Birmingham, Mich., paid $4,000 for: failing to obtain vehicle inspection reports for at least three months; operating a motor vehicle in such a condition that it was likely to break down or cause an accident.
- **Eastern Tank Lines,** Dayton, Oh., paid $2,592.75 for operating a motor vehicle without the required minimum levels of financial responsibility.
- **Rite-Aid Distribution Center,** Rome, N.Y., paid $20,000 for requiring/permitting drivers to operate for more than 10 hours or after having been on duty for 15 hours.
- **Coca-Cola Bottling Co.,** La-Crosse, Wisc., paid $1,000 for operating a motor vehicle without the required minimum levels of financial responsibility.
- **Victory Freightway Systems,** Sellersburg, Ind., paid $5,000 for requiring/permitting drivers to make false entries upon a record of duty status.

Preventable or not?



The fatal accident occurred at 5:45 a.m. as John Doe headed his tractor-trailer southward at 53 mph along Highway 177, a two-lane, black-asphalt roadway in rural Oklahoma. Earlier, rain had fallen and the sky was dark and overcast. The stage was set for disaster by a "mostly black" cow which, presumably tired of dragging its udder through wet grass, decided to dry off by standing in the middle of the south-bound lane.

A member of the National Safety Council's (NSC) Million Mile Club, John crested a small rise in the roadway and drove approximately 400 yards before ramming the cow with his conventional-cab Freightliner, leaving 130 ft of skid marks in his wake. Notably, the point of impact was approximately 40 ft from an intersection.

After knocking the unfortunate bovine 80 ft down the highway, the tractor-trailer traveled about 50 ft from the point of impact before it jackknifed and came to rest in the intersection.

While the company's accident committee ruled the accident preventable, John and his terminal manager felt the judgment was patently unfair.

Consequently, accident data was submitted to NSC's Accident Review Committee for a final decision. In a cover letter to NSC, the terminal manager noted that John's tractor was equipped with an on-board computer that documented a sustained running speed of 53 mph with a brake application prior to impact.

The terminal manager emphasized that the Freightliner was equipped with halogen lamps which, at 53 mph, would preclude over-driving the vehicle's headlights. In sum, he said, John was driving defensively, applied the brakes as soon as the animal was sighted and attempted to take evasive action.

In NSC's judgment, the theoretical role of halogen headlamps in preventing the driver from over-driving his headlights at 53 mph is invalid, since the lenses would have been dirty and wet like the surface of the highway.

NSC ruled the accident preventable because John was traveling too fast for conditions—a dark, rain-slicked road in stormy weather. In addition, NSC said, John clearly was approaching a crossroad and should have displayed greater caution at that point.

Deaths In Tractor-Trailer Crashes by Highway Type, 1987

	Freeways	Major Roads	Minor Roads
Single-Vehicle Crashes	194	218	13
Multiple-Vehicle Crashes	631	2,489	154
Crashes Involving Pedestrians and Bicyclists	89	187	33

Source: Insurance Institute for Highway Safety

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TRW RECALL: What In The World Happened

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VOLUME 146 NUMBER 2 FEBRUARY 1989

TABLE OF CONTENTS

FEATURES	TRW RECALL Behind-the-headlines look at how TRW handled the recall	48
	HCX SCALPEL CUTS COMP COSTS How carriers use a monitor system to reduce comp costs	54
	SHOP TIPS & TRICKS CONTEST WINNERS Best ideas on how to save time and money in the shop	59
COLUMNS	Editorial / TRW employees set safety recall standard	7
	Washington Report / Bureaucrats drive you 'crackers'	31
	Business Side / System speeds up weighing process	35
	Safety / FHWA annual inspection is no problem	41
	Maintenance/Technology / Drum and rotor wisdom	65
DEPARTMENTS	Readers' Forum	8
	Up Front	12
	Industry Watch	16
	Classified Advertising	129
	Advertisers' Index	131
	SideRoads	132
PRODUCTS	New Product And Services	71
	Publications	128
POSTCARDS	Truck Talk Postcard	33
	Brake Book and Reader Service Cards	121
	Subscription Cards	123

Page 54

Page 59

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IN THIS ISSUE

To help fleetmen survive in the coming decade, CCJ will publish a special March issue dedicated to "Trucking in the 1990s." Based on hundreds of interviews and extensive research, "Trucking in the 1990s" will offer projections on:

- *The Business Outlook* will include economic forecasts, intermodal trends and the U.S. stake in a unified Europe.
- *Governing Factors* will cover funding road programs, automated highways, the "Decade of Uniformity" and an expert's tax outlook.
- *Equipment Considerations* will forecast how engines will meet emissions standards, technology that will enhance low-cost operation and high productivity, plus materials and components that will dominate the trailer market. □

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HCX SCALPEL
CUTS WORKERS COMP COSTS

Workers' compensation costs are spiraling upward in part because of increasing medical costs. St. Johnsbury Trucking Co. has joined two other major carriers and several other transportation firms in a new medical monitoring system with a track record of reducing medical costs and getting workers back on the job quicker.

By **JAMES PIERPOINT**
Senior Editor

Bill Milaschewski has discovered a program that cut St. Johnsbury Trucking Co.'s workers' compensation costs and helped injured workers return to work faster. At a time when spiraling health care costs inflate workers' compensation premiums, the program has reduced the carrier's compensation-related expenses 15% and cut the number of work days lost due to injuries by 17%. At the same time, St. Johnsbury has improved the quality of medical care provided for its injured workers.

The program is run by Health Care Excellence (HCX) of Washington, D.C. In addition to St. Johnsbury, its clients have included Leaseway, the U.S. Postal Service, several major railroads, a transit authority and a major utility.

All of these companies face higher rates of injured workers typical of transportation firms. And all are providing quality health care for their injured workers while reducing compensation-related costs and work days lost because of injuries.

"We were somewhat skeptical" of the claims that HCX could lower costs while helping to improve patient care, said Milaschewski, St. Johnsbury's director of insurance. But Milaschewski lost that skepticism when compensation costs per 10,000 working hours fell from $759 in 1985 to $593 under the medical-monitoring program.

According to the National Safety Council (NSC), less than 2% of all workers are injured on the job annually, and the average injury causes the employee to miss about seven and a half days of work.

In the trucking industry, those numbers are dramatically higher. More than 17% of trucking company employees were injured in 1987, and the average worker spent more than 22 working days recuperating.

In fact, the trucking industry for the past two years posted the highest average number of injuries per firm of the 42 industries monitored by the NSC. In terms of injuries per hundred workers and days lost from work, trucking is more dangerous than railroading, mining, logging and construction.

"Health care expense [for injured workers] is a runaway freight train," according to Jack Dugan, HCX spokesman. Due to increasing medical costs, health care in the U.S. now accounts for 11% of the gross national product, equaling 2% of all payroll dollars. Workers' compensation costs have risen an average 16% annually since 1980, and last year cost American industry an estimated $35 billion.

Because of increasing costs, insurance companies are not able to cover their compensation expenses. In 1987, benefit payments exceeded premiums by more than $155 million in both California and Maine. Of 32 state programs administered by the National Council on Compensation Insurance, only Delaware insurers logged an un-

Continued

derwriting profit: $1.5 million on $80.3 million in premiums received during 1987.

While medical costs represent a major part of total workers' compensation expenses, another significant expenditure is incurred in lost productivity – working days lost as the injured worker recuperates.

"The cost to trucking companies is at least as much in lost time as in medical costs," Dugan said.

HCX helps reduce those costs by monitoring the medical treatment of injured workers. The system not only checks the accuracy of diagnoses, it also monitors the progress of the patient.

"Our whole focus is return to work and quality of care," HCX spokesman Dugan said.

HCX marketers had approached St. Johnsbury's then-parent-corporation, Sun Co., in 1985, hoping to initiate a pilot program with the diversified corporation. As Sun's largest trucking component and largest producer of workers' compensation claims, St. Johnsbury was selected for the program.

Through a "fronted" arrangement with a major insurer, the carrier essentially maintains self-insurance. While the insurer processes St. Johnsbury claims, the motor carrier reimburses the insurer's costs for the claim payments. Milaschewski doubted that a health-care system could improve his fleet's loss experience.

Despite misgivings, Milaschewski established a pilot program at St. Johnsbury's 10 largest terminals. The results painted a clear picture of the effectiveness of the HCX program. For workers in the 10 larger terminals, the number of days injured workers were off the job fell 15% in 1986, and the fleet's cost per injury dropped 17%.

Specifically, lost time fell from an average 25.7 days per injury to 21.9 days in 1986. And St. Johnsbury's costs per injury fell from an average $1,429 in 1985 to $1,188 the following year. These savings were produced while medical costs rose 25% generally, Milaschewski noted.

"We were looking for a way to maintain control over losses," he said. "But at the same time, we were looking for a way to manage injured workers." According to Milaschewski, the HCX program provided both.

One important factor in the health monitoring equation is the well-being of the injured employee. A major benefit of an HCX-type system is that the fleet can track the progress of an injured worker.

Several St. Johnsbury employees injured on the job have expressed their appreciation that someone is concerned about their recovery from a workplace injury.

"At St. Johnsbury, we try to treat injured workers with respect, assist with the medical care and get the employee back to work as soon as possible," Milaschewski said. In addition to the physical trauma, injured workers face a cut in pay and a disrupted lifestyle following an injury.

"The chips are down for the injured worker," Milaschewski said. "And you can't expect insurance companies to take care of your injured workers."

While St. Johnsbury runs essentially a self-insured operation, carriers opting for coverage through traditional insurance policies also can benefit from a patient-monitoring system, Milaschewski said.

Because retrospective rating systems used by insurers force premiums to rise or fall in response to expenses from previous years, carriers that reduce their compensation costs will benefit from stable, if not falling, premiums in later years, Milaschewski noted.

Besides, insurance companies are not capable of tracking the cost-effectiveness of medical care until after the bills come in. "Insurance companies analyze medical costs after the fact," Dugan said. By the time an insurer discovers that medical treatment was inappropriate or overly expensive, the treatment and costs already have been incurred.

IMPACTS OF MONITORING WORKERS' COMP CLAIMS

	Year Before Program	First Year in Program	Second Year in Program
ST. JOHNSBURY			
Days lost	25.7	21.9	23.6
Costs/claim	$1429	$1188	$1262
PEPCO			
Days lost	32.4	21.5	10.9
Costs/claim	$7464	$5048	$2959
USPS			
Days lost	22.1	14.5	N/A
Costs/claim	$1433	$1200	N/A
MID-ATLANTIC STATE			
Days lost	23.1	13.6	N/A
Costs/claim	$761 (est.)	$491 (est.)	N/A
WESTERN STATE			
Days lost	18.6	13.6	N/A
Costs/claim	$457	$237	N/A

SOURCE: Health Care Excellence (HCX)
NOTE: Lost time equals average lost work days in compensation cases. Costs per claim equals average medical and compensation costs.

St. Johnsbury isn't the only transportation company to cut costs and improve medical care through the HCX program. First implemented as a research project at the Potomac Electric Power Co. (PEPCO), Washington, D.C., the HCX process cut the number of working days lost to injuries by 89% at the utility. Average days lost per injured worker fell from 32.4 to 10.9.

The U.S. Postal Service also allowed HCX founder Dr. Henry Feffer to apply his process to compensation cases, and experienced similar improvements. The average days lost by an injured worker fell from 22.1 to 14.5 in one year.

"We had no idea we were saving anybody money until the chief financial officer at PEPCO told us we had saved the utility a million dollars," Dugan said. The PEPCO savings prompted Dr. Feffer to begin applying his academic research on a more practical level, and HCX was born.

Based in part on this research, Dr. Feffer developed a computerized system for monitoring an injured worker's symptoms, diagnosis, prescribed treatment and the patient's response. The process compares the patient's progress with the latest standards for medical treatment and recovery established by the medical community.

Dozens of orthopedic injuries, treatments and recovery profiles where broken down into "decision trees" based on the medical standards. Branches of each tree list a symptom and provide a series of possible treatments. Surgery is typically the final recourse after several other types of treatments have failed.

While the process helps forestall unneeded surgery, in some cases it has prompted physicians to keep injured workers off the job longer. During the postal service research, "in two cases we picked up problems missed by the treating physicians and kept the patients out of work longer than prescribed," Dr. Feffer said in a medical journal article on the program.

"This lent validity to our role as unbiased consultants," he said in the article.

In addition to monitoring patient care and the appropriateness of the medical care, the HCX process maintains a link between the injured employee and employer. St. Johnsbury's Milaschewski feels that link has helped employees cope with the strains of being injured and out of work.

"We work with the employee as well as the physician," HCX's Dugan said.

Five state workers' compensation funds rely on HCX to monitor care provided for injured workers. In one state, lost working days fell from 18.6 to 13.6. In another, aver-

Continued

Marketing medical monitoring methods

Algorithms, medical theory and diagnostic technology. The terms used by HCX executives indicate that the firm is rooted in academia. But their success indicates that HCX's branches may soon span well beyond the realm of the university.

HCX was founded in 1984 by Dr. Henry A. Feffer, a George Washington University professor emeritus and an orthopedic surgeon for the past 40 years. The 71-year-old's work week spans six days and includes 50 patient consultations.

Recent medical research has "blown holes in a lot of myths about medicine," HCX spokesman Jack Dugan said. For example, extended bed rest for back injuries does more harm than good by causing the patient to lose 6% of the bodies vital calcium. As a result, Feffer recommends that patients go for walks between periods of rest to keep their strength up.

In 1989, HCX will expand its program to include burns, lacerations and hernias. The additional focus will cover 90% of all workers' compensation injuries. The remaining 10% would include stress claims and environmental injuries.

The company is marketing its services to four groups concerned about workers' compensation costs. In addition to large, self-insured industrial firms such as trucking companies, the company provides its health-care monitoring service to several states, is marketing its program through insurance brokers and hopes to sell some services to the federal government.

With the types of injuries its employees suffer, the transportation industry is a natural market for the monitoring program. In addition to selling services directly to the largest carriers, the firm is considering plans to develop a consortium that would provide access to the program for smaller carriers.

During 1989, HCX hopes to add 15 firms to its rolls, increasing its pool of patients by 300% to 400%.

HCX 'rides herd on physicians'

Orthopedics, the treatment of injuries to the muscles and bones, is involved in two-thirds of worker compensation injuries and 90% of the costs, according to HCX executives. Back injuries alone account for 25% of the cases and up to 50% of the costs.

HCX founder Dr. Henry Feffer often asks patients who have undergone back surgery how they have felt since the operation. While 40% report feeling better, the remaining 60% are experiencing some degree of continued back pain.

"With a 40% hit rate, something is wrong," said Jack Dugan, HCX spokesman.

There are 20 times the number of spinal fusions in the U.S. than in the rest of the world. And a patient in Los Angeles is twice as likely to have back surgery than a patient in Boston, Dugan said

"It's the standing army problem," Dugan said. In addition to general practitioners, interns, chiropractors and neurosurgeons, there are 14,000 board-certified orthopedic surgeons available in the U.S. "The more surgeons there are, the more operations" are going to be performed, said Rick Cotton, HCX president.

"We ride herd on physicians" to reduce these sometimes unneeded surgeries, Dugan said. HCX provides a medical monitoring service to check diagnoses against the latest standard medical practices. The process can forestall unneeded surgery, or lead to a recommendation of surgery in cases where the procedure is warranted.

WORKERS' COMP UNDERWRITING EXPERIENCE IN 1987.*

STATE	GAIN (Loss)
FLORIDA	(157,492,384)
MAINE	(155,340,991)
LOUISIANA	(139,805,118)
MASSACHUSETTS	(124,648,832)
ILLINOIS	(81,409,916)
GEORGIA	(54,837,369)
MISSOURI	(54,387,920)
TENNESSEE	(49,453,694)
RHODE ISLAND	(48,229,762)
MICHIGAN	(32,217,778)
CONNECTICUT	(31,172,490)
ALABAMA	(30,227,590)
IOWA	(28,766,551)
ARKANSAS	(28,016,929)
KENTUCKY	(28,015,851)
KANSAS	(27,708,894)
NEW MEXICO	(27,281,106)
SOUTH CAROLINA	(24,704,621)
VIRGINIA	(23,990,724)
NEW JERSEY	(22,734,047)
NORTH CAROLINA	(15,055,675)
OREGON	(13,686,670)
INDIANA	(11,675,263)
NEBRASKA	(8,324,578)
MISSISSIPPI	(7,071,098)
SOUTH DAKOTA	(6,841,298)
VERMONT	(5,114,198)
DISTRICT OF COLUMBIA	(4,528,328)
ALASKA	(3,781,728)
NEW HAMPSHIRE	(3,247,716)
HAWAII	(2,526,488)
ARIZONA	(2,436,214)
DELAWARE	1,478,187
COUNTRYWIDE TOTAL	(1,253,052,654)

*1982 was the only profit year over past 10 years for workers' compensation insurers.

age hours of compensated leave fell from 185 to 109. The average compensation payments and medical costs also fell in both states.

Unlike general health care, workers' compensation is mandated by law. Self-insured employers are responsible for medical payments, salary, impairment awards and legal costs for each on-the-job injury. Premiums for employers with traditional compensation insurance coverage also are based on these costs.

By reducing risk, treatment-monitoring systems can save trucking companies money. Though fees may vary, firms pay $10 to $14 per employee for the monitoring service and periodic reports. The programs also can help employees return to work quicker, and perhaps ensure better health care for the injured worker.

"We are not a cost-containment firm," Dugan said. Those services typically audit and monitor patient billing for accuracy, and review the length of time a patient plans to stay in a hospital.

"We do not pitch cost-containment, we pitch quality of care," Dugan said.

HCX has built a network of 1,000 physicians who are available for second opinions when symptoms, diagnoses, treatment and response do not fall into the parameters established by the firm.

In 80% of these cases, no second opinion is required. In the remaining 20%, an injured worker is asked to visit a physician in the HCX network. In 85% of these referrals, the HCX physician finds an incorrect diagnosis or treatment, or determines that a patient is not following prescribed treatment.

"We're looking for undertreatment as well as overtreatment," Dugan said.

Most patients are monitored for six months, with the most benefit coming during the second and third months of treatment.

"We can make a substantial impact on the transportation industry," Dugan said. "It's a question of how we reach it." □

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TRUCKING
IN THE

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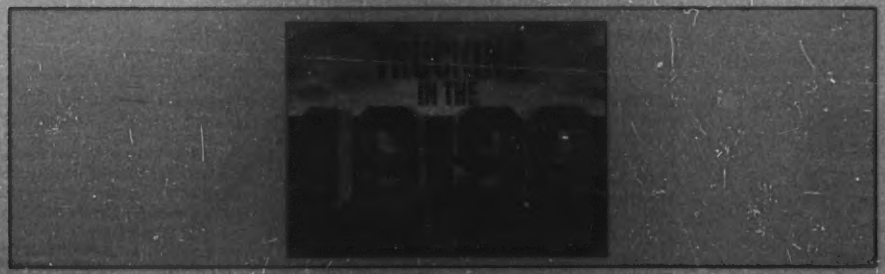
TABLE OF CONTENTS

FEATURES	INTRODUCTION: TRUCKING IN THE 1990s	70
	THE BUSINESS OUTLOOK Global and domestic economic trends	73
	GOVERNMENT FACTORS Political, regulatory and tax issues	99
	EQUIPMENT CONSIDERATIONS Engine emissions, cabs & chassis, dry vans & reefers	127
	INFORMATION SOURCES Publications accessed for background information	161
COLUMNS	Editorial / It's like spitting in the wind	9
	Washington Report / A kinder, gentler, costlier nation	49
	Business Side / Fleets make money on the side	53
	Safety / Commercial zones and rampant misinformation	61
	Maintenance & Technology / Cooling systems	163
DEPARTMENTS	Readers' Forum	12
	Up Front	16
	Industry Watch	20
	Coming Events	66
	Classified Advertising	203
	Advertisers' Index	205
	Publisher's Report	208
PRODUCTS	New Product And Services	169
	Publications	202
POSTCARDS	Truck Talk Postcard	57
	Brake Book and Reader Service Cards	193
	Subscription Cards	195



Page 70

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IN THE NEXT ISSUE

The April issue will offer details on revised criteria for placing vehicles out of service at roadside safety inspections, which were established jointly by the U.S. Department Of Transportation and Commercial Vehicle Safety Alliance. Information will include how inspectors determine when a vehicle has an out-of-service defect requiring the unit to be repaired at the inspection site or towed away, and when a vehicle with a restricted-service defect may be placed out of service or permitted to travel directly to a repair facility.

Much of the April issue will be devoted to the Fleet Reference Annual, with information on: reciprocity; registration; sizes and weights; permits and taxes; access restrictions; fuel taxes; where long combination vehicles can go. □

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INDUSTRY WATCH

CCJ wins Neal awards for editorial excellence

Commercial Carrier Journal won two prizes in the 35th annual Jesse H. Neal Editorial Achievement Awards competition, sponsored by the Association of Business Publishers. Since 1982, CCJ has won nine Neal honors—more than any trucking industry publication.

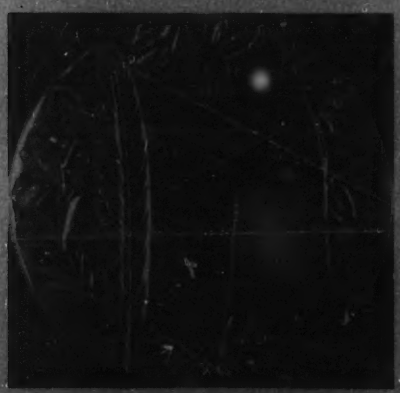
Winning entries in the 1988 competition were:

• A Neal award for a series of articles on drug screening written by Parry Desmond, executive editor. The series detailed each step required to establish a cost-effective, legally defensible drug testing program.

Part one provided basic information fleet management should know about drug testing. Part two discussed state drug testing laws. Part three explained how carriers can establish a rehabilitation program. And part four showed how one carrier's drug testing program saved the company money.

• A Certificate of Merit for Jerry Standley's editorials, which examined and commented on several controversial issues facing the industry.

The editorials: criticized an industry proposal to lower the driver age to 18; warned trucking companies about state drug testing laws; exposed the bias in a survey by the Regular Common Carrier Conference of the American Trucking Associations; and praised an industry attempt to improve truck accident reporting statistics. □



1988 Preliminary New Truck Retail Sales (Including Imports of U.S. Manufacturers)

	CALENDAR YEAR		Percent Change
	1988	1987	
Class I	2,028,628	2,096,152	-3.2
Class II	1,333,911	1,173,880	+13.6
Class III	14,252	14,067	+1.3
Class IV	21,581	2,129	+913.9
Class V	6,310	5,153	+22.5
Class VI	55,603	44,202	+25.8
Class VII	103,818	102,230	+1.6
Class VIII	143,749	131,156	+9.6
Total	4,607,042	4,173,549	+10.4

Source: Motor Vehicle Manufacturers Association
[illegible] sales of Class IV trucks was also [illegible] Ford Motor Co.'s new F-Series Pickup [illegible]

Consolidated Freightways plans to purchase Emery

Consolidated Freightways, Inc. and Emery Air Freight Corp. of Wilton, Conn., have signed a definitive merger agreement in which Consolidated Freightways will purchase all outstanding shares of Emery stock in a cash tender offer. The total purchase price is approximately $230 million.

Larry R. Scott, president and chief executive officer of Consolidated Freightways Inc. said that, following the merger, operations of Emery and CF AirFreight will be merged, with the combined company operating under the name "Emery Worldwide, a CF Company." The combined company will be headed by Donald G. Berger, current president of CF AirFreight.

Consolidated Freightways Inc., is a diversified transportation company with business in long-haul trucking, air freight, regional trucking and rail piggyback and ocean intermodal services. Revenues in 1988 were $2.7 billion.

Emery Air Freight Corp. provides worldwide air courier/cargo service through an integrated courier/cargo system. The company reportedly lost $17 million on revenue of almost $1 billion in the first nine months of 1988. □

Highway users group studies smart highway technology

With research and development of future "smart highway" technology advancing rapidly overseas, the Highway Users Federation has formed a committee to assist U.S. efforts to catch up to its European and Japanese counterparts.

The Highway/Vehicle Technology Committee will ultimately help identify businesses and industries with a role in the research and development of smart highway technology and will help coordinate a free flow of information, according to the Highway Users Federation.

The most promising developments in "smart highway" technology are in computers in the car and on the highway that monitor traffic conditions and plan optimal or alternate routes.

But systems are being developed that will keep the driver informed of his current location and allow automatic billing for toll road or parking facility use.

The largest intelligent vehicle project in the U.S. is the $32-million Smart Corridor project in Southern California, which will begin in 1991. The locally-funded project will include monitoring traffic flow over a 12.3 mile segment of the Santa Monica Freeway, and then using changeable message signs to control vehicle movement and increase traffic capacity. □

The Business Outlook

...Cautious Optimism

Manufacturing recovery

"Continued economic growth, fairly stable interest rates, slow inflation and declining federal budgets and trade deficits." That's the U.S. Commerce's Department's basic forecast for the 1990s. One reason for those projected improvements is Commerce's forecast that the recovery of the U.S. manufacturing sector—most of which is at or near peak capacity—"is expected to continue over the long term."

Writing in the department's recently-published *Industrial Outlook 1989*, Dr. Christopher C. Barnekov of the Interstate Commerce Commission, was optimistic about trucking's long-term prospects. His analysis of the industry in the next decade included the following observations:

• Investment by all types of carriers in new, more efficient equipment—and their ability to acquire ready financing—"strongly suggests widespread confidence in the medium- to long-term future for intercity trucking, at least for efficient carriers."

• There will be "some upward pressure" on the rates of truckload (TL) and other nonunionized fleets. That "may increase LTL carriers' market share and the Teamsters' bargaining power somewhat. The spillover isn't likely to be strong enough to restore LTL volumes or Teamsters' wages (in real dollar terms) to their pre-1980 levels."

• Analysts estimate that $20 billion to $30 billion in additional annual transportation and logistics savings "may be attainable" by completing the economic deregulation of trucking, including removal of intrastate barriers.

Tonnage up

Adrian T. Dillon and James P. Meil, economists for Eaton Corp., Cleveland, Oh., noted in a recently-completed forecast: Federal deregulation produced a "nearly instantaneous 20% to 25% increase in average truck productivity due to elimination of 'gateway' cities, drastic reduction in empty backhauls and increased competition

Continued

among truckers," resulting from price discounting.

But those factors also produced "roughly 20%" excess truck fleet capacity, according to the Eaton economists. That over-capacity reduced new heavy-truck sales in the 1980-'86 period by 19%, compared to replacement rates of 1974-'79. However, in the first half of the 1980s, truck tonnage was 14% higher than during the latter half of the 1970s.

While deregulation has had "an even more devastating impact" on the trucking industry than expected in 1982, continued the report, "the 'reindustrialization' of America, still in its early stages, has added even more stimulus to truck tonnage than we expected six years ago."

Lower fuel prices and just-in-time inventory policies also boosted trucking more than Eaton projected in 1982.

With tonnage "expected to outpace GNP growth by 0.5% to 1% annually over the next six years, and tonnage hauled to average 50% above the levels of the late 1970s, Eaton expects North American factory sales of Class 8 tractors "to approach the peaks" of the '70s.

The macro-economic assumptions Eaton used to develop its Class 8 sales forecast include:

- Real GNP growth will average about 2.8% annually, slightly above the 2.6% annual growth average of the 1980s to date.
- Consumer spending, which grew 3.4% annually from 1980-'88, will slow down to a 2.3% annual growth rate.
- Housing and nonresidential construction, which boomed during the first half of this decade, will decline over the next five years.
- Manufacturing and trade are expected to show substantially better growth in the half decade ahead. Trade is expected to add 0.7 percentage points, a 25% increase to average growth from 1988-'93. And industrial production, which rose only 2.4% annually in the decade to date, is forecast to increase 3.9% annually over the next six years.

The economists point out that intensity of truck use is four-to-seven times for a domestically-produced good for domestic consumption versus one-to-two times for an import and three-to-five times for U.S.-produced goods for export.

U.S. trade, however, "won't return to a balance before 1993, when our cumulative debt burden with the rest of the world will reach roughly $750 billion. Simply servicing the debt will require a trade surplus of $50 billion annually in the 1990s." The surplus will come from the $200 billion trade improvement that "will be generated from manufacturing." Thus, it's likely that manufacturing growth "will continue to exceed" that of the overall economy into the 1990s.

- Capital spending will be the major beneficiary of increased industrial strength, with equipment purchases—including trucks—projected to rise 6.8% annually.

Equipment replacement demand has been a diminishing factor in the Class 8 market, claims Eaton. The typical replacement cycle for "first use" tractors has been extended from six years in the 1960s to at least seven years today.

The reasons for the "dramatic changes" in the sources of economic growth are, say the Eaton economists, the sharply lower U.S. dollar and record productivity growth in manufacturing that have made the U.S. the "low-cost nation for high value-added manufacturing, and the accumulated foreign debt."

ANNUAL ECONOMIC GROWTH RATE BY REGION, 1986-1996

Region	Percent
1. South Atlantic	2.4
2. Mountain	2.1
3. New England	2.0
4. Mid-Atlantic	2.0
5. Pacific	1.8
6. West South Central	1.8
7. East North Central	1.7
8. East South Central	1.2
9. West North Central	1.2

Source: SRI International, Menlo Park, Calif.

Economic revival in 1991

Economic Consulting and Planning Inc. (ECAP), a New York City forecasting firm which is the former Merrill Lynch Econometrics Inc., also used an equipment orientation to make its predictions.

According to ECAP: "Outright weakness is expected to emerge as 1990 unfolds." That's why truck traffic and corporate profits "will falter, initiating a more conservative approach to equipment acquisition." However, the subsequent economic revival, beginning in 1991, "won't trigger" an immediate purchasing rebound, advises ECAP economists.

Underlying factors that "suggest continued strong sales" levels during the 1990-'93 period include, says ECAP: the "age and questionable condition of much of the truck fleet, enormous pressure on owners and users of trucks to improve service and efficiency and to lower costs, availability of a wide-range of new products, and the long-term expansion plans of key players in the for-hire carrier market.

"As evidence of a faltering economy mounts," continued ECAP, "orders for equipment will soften appreciably." Truck sales in 1990 will decline only by 2.5%, to 305,000 units. And sales will remain depressed as 1991 unfolds, despite a revival in economic activity, truck traffic and corporate profits. Modest improvement in truck demand late in 1991 will do little to salvage the year as sales decline an additional 3.4% to 294,000 units.

Beyond 1991, ECAP predicts a "healthy increase" in equipment demand. In addition to non-economic factors, motor carrier traffic will grow, putting pressure on fleet owners to expand, "and we anticipate relatively robust growth in corporate profits."

Class 3 to 8 truck sales are forecasted to increase 3.8% in 1992 and 3.7% in 1993.

"The revival we anticipate late in the forecast period reflects improving economic fundamentals and mounting replacement pressure, as equipment purchased in the late 1970s is finally scrapped," concludes ECAP.

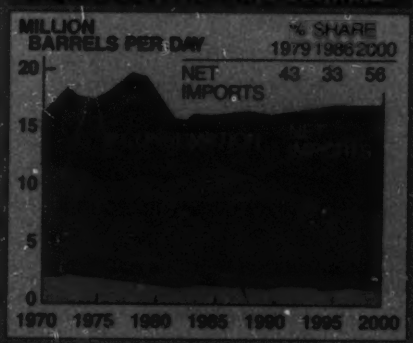
Trailer shipments "will remain sluggish" until traffic levels grow to the point where existing capacity is once again being strained and key buyers realize "substantial forward momentum" profits.

Van trailer shipments are slated to decline 3.6% to 124,100 units in 1990, says ECAP. "Weakness in construction and mining activity will contribute to a 6% drop in non-van trailer shipments." Trailer shipments for 1991 will decline 2% to 167,000. Beyond 1991, predicts ECAP, trailer shipments will "increase 6.8% in 1992 to 179,000 units and 5.9% in 1993 to 189,700 units." □

CLASS 8 TRUCK NORTH AMERICAN FACTORY SALES HISTORY AND OUTLOOK

Oil price outlook

U.S. OIL SUPPLY AND DEMAND



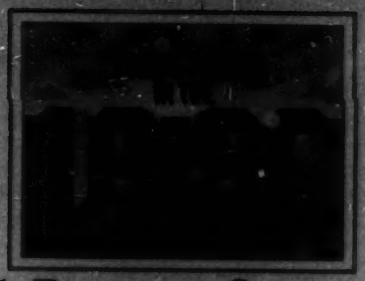
Real oil prices on the world market will remain below $20 per barrel until 1994, according to the most recent *Annual Energy Outlook*, published by the U.S. Department of Energy (DOE). "Thereafter, increasing world oil demand is expected to begin absorbing excess supply, so oil prices should then increase more rapidly—reaching $31 (a barrel) by the year 2000," DOE says.

Total U.S. production in 2000 "is expected to drop from the 1987 level of about 8.3 million barrels per day to around 6 million. This reflects a more optimistic assessment of the future potential for older producing regions within the Lower 48 States," concludes DOE.

Declining oil production in the U.S., brought on by the 1986 oil price collapse, will continue, according to Chevron Corp.

"Higher development and producing costs associated with more mature U.S. oil fields make it difficult to reverse the declining domestic supply trend," says Chevron officials.

"Production from traditional producing states, such as Texas and Louisiana which were hit the hardest by the price decline, will continue to fall until oil prices begin to increase in the 1990s. By 1995, the rate of decline of U.S. supply is expected to stabilize at around 2% a year," says Chevron.



The Business Outlook

Who Will Haul The Freight

Impact of competition

Market research by a major tractor OEM shows that the following shifts in purchasing patterns of new Class 8 power equipment by various sectors in the trucking marketplace will occur in the mid-1990s as the industry's competitive environment changes:

• Reflective of the freight captured from private fleets by common carriers, purchases by for-hire carriers will grow from 23% in 1987 to 30.5%. And private carriers' current 33% share of new Class 8 purchases will shrink to 26%.

• Full-service lessors will increase their purchases from a 22% share in 1987 to 26%. That's because private carriers—the largest sector of the full-service customer base—will reduce the proportion of Class 8 tractors they own.

• Many TL carriers are switching to company-owned power equipment, so the proportion of tractors purchased by owner operators will decline from 17% to 12.5%.

• Purchasing volume for government fleets at all levels is expected to remain at the 5% level.

"There won't be a significant increase" in the amount of freight in the next decade, claims Joseph Devane, vice president of sales, Dorsey Trailers Inc., Elba, Ala.

Since the number of LTL fleets will decline, says Devane, the surviving carriers will capture more load volume. But there will be an increasing number of fleets chasing after a static amount of TL freight. Only the "safe, efficient TL carriers that offer superior customer service and differentiate themselves from the competition will succeed" in the fast-growing TL sector of the market, says Devane.

Trucking industry leaders interviewed all acknowledged that the consolidation of freight volume, revenues and profits by big LTL carriers, as noted in the "20-Year Analysis of The Top 100" (CCJ, July 1988) will continue into the 1990s. The article detailed how the leading LTL carriers—United Parcel Service, Yellow Freight, Consolidated Freightways and Road

Continued

way Express—have captured an increasing share of revenues and profits over the past 20 years.

In 1968, the big four garnered 19.5% of the revenues and 31% of the profits shared by the Top 100 for-hire fleets. Last year, the four carriers increased their foothold on trucking with 40% of the Top 100's revenues and 48% of the profits.

For-hire vs. private fleets

John Throckmorton, consultant for A.T. Kearney, Chicago, says for-hire carriers will continue to capture freight from private fleets but at a slower pace. That's because private fleets are "leaner, more productive, better managed, and have an improved service orientation," claims Throckmorton.

He also believes the "cherry-picking" of private carriage's profitable freight by for-hires no longer exists. As a result, there will be a "5% annual growth rate" in the continued shift of traffic from private fleets to common carriers.

In the battle between the national and regional carriers for short- to medium-length hauls, Throckmorton adds, the reduction in the number of fleets used by shippers is having an impact in the LTL and the TL marketplaces.

"Shippers want the nationals to offer service levels provided by the regionals," he claims. "Someday, there will be mega-carriers offering a supermarket of services," but Throckmorton isn't sure that shippers are ready for that scenario.

Also commenting on the competition between regional and national carriers was George Morris, a financial analyst with Prescott, Ball and Turben, a Cleveland brokerage. "The regionals will have to put up with the LTLs who are capturing short-to medium haul traffic through subsidiaries such as Consolidated Freightways' Conway Express and Roadway's Viking," noted Morris.

"The LTLs have the deep pockets and deep management, and the big, strong guys tend to win, no matter if it's trucking or baseball," observed Morris.

However, in the TL marketplace, says Morris, "only Builders Transport has captured much traffic from private fleets." Most other TL carriers only have grown through geographic expansion, he added.

Morris predicted a major shakeout when the long-expected recession happens in the coming years, and "many TL fleets will be absorbed by the larger carriers."

Craig Kloner, a financial analyst for Goldman and Sachs Co., New York City, insists that "neither the amount of freight for-hire carriers capture over the next 10 years, nor the health of the economy, will have any impact on the number of trucks in private fleets." Kloner insists that the number of trucks in the private carriage sector will remain "absolutely" at the same level in the next decade as it is today.

"Following the deregulation of trucking, there was a big fallout of private carriers when the freight rates dropped," says Randy Dennis, Navistar's general manager-heavy duty-products.

However, adds Dennis, "today's private carriers have found their fleets provide economic service or promotional advantages. As a result, I don't see a major shift occurring from the remaining private carriers to the for-hire sector." □

HEAVY TRUCKS' PROJECTED PRODUCTIVITY CHANGES, 1968-1996

	1968	1987	1996
Capacity (tons)	24.2	27.7	28.0
Load factor (percent)	57.9	67.1	66.9
Speed (mph)	41.2	46.4	48.5
Hours moving a year	1,723	1,742	1,898
Annual density-adjusted ton-miles	823,507	1,206,573	1,317,104

Source: SRI International, Menlo Park, Calif.

A.T. Kearney's John Throckmorton says for-hire carriers like Matlack will continue to capture loads from private fleets.

Craig Kloner, Goldman Sachs Co., says the number of trucks in private fleets "absolutely" will remain at the current level.

Conrail's intermodal volume, according to Conrail officials.

• "Since piggyback was fully deregulated in 1981, intermodal car loadings have grown at an average annual 8.9% rate, up sharply from the 3.4% growth rate from 1967 to 1980," wrote analyst Stephen Klein in Standard & Poor's Sept. 22, 1988 *Industry Survey*.

However, adds Klein, much of intermodal's growth stems from the diversion of freight from railroads' boxcar service to trailers-on-flatcars (TOFC). "TOFC has doomed the boxcar to extinction since shippers prefer moving merchandise by railroad, dock-to-dock, in a single trailer: handling costs are lower and the risk of lost or damaged freight is reduced."

Piggyback grew to 15% of rail car loadings in 1987 from less than 1% in the mid-1950s, continues Klein. "Approximately 40% of piggyback loads are thought to be international container movements."

Despite that rosy picture, many truckers are reluctant to discuss how much intermodal work they're doing. According to industry sources, that's because some shippers are paying higher truck rates for freight that's being moved via rail. And some shippers "have long memories" of when they were burned 15 to 20 years ago when intermodalism started, because of lots of big damage claims, says McQuaid. Some are queasy about having their product move by rail because they think rail movements create damage claims and slow delivery problems.

But Kenneth Maxfield, president of North American Van Lines, told attendees at an intermodal session at the 1988 ATA Management Conference that his company's intermodal rail claims experience doesn't compare to those of 15 to 20 years ago. Anyway, added Maxfield, profits generated by using rail in lieu of trucking makes the claims risk worthwhile.

Maxfield said the rails' 99% on-time performance is superior to the truck sector's. He also noted that rail doesn't have to contend with breakdowns or weather problems, as truckers do.

MODAL SHARES OF U.S. FREIGHT

	Percent by Mode		1987-1996 Growth Rate
	1987	1996	(percent)
Short-haul truck	6.5	6.9	2.7
Long-haul truck	26.9	28.1	2.4
Total truck	33.4	35.0	
Rail	29.4	29.1	1.8
Pipeline	24.2	22.2	0.9
Water	13.0	13.7	2.4
Total	100.0	100.0	1.9

Source: SRI International, Menlo Park, Calif.

Initially, double-stack trains were used solely to move to and from ports. But now they also criss-cross the country, almost doubling rail productivity with each movement.

New options

Examples of new intermodal rail options that are attracting freight formerly handled by rail include:

• a 76-hour dedicated train from New York to California, operated by Conrail in cooperation with the Santa Fe Railroad. Much of this "premium service" train is now being used by UPS and the U.S. Postal System. But Conrail also has expanded the service to capture less-than-truckload traffic and other time-sensitive freight.

• many overnight rail movements. For example, a Safeway distribution manager based in Phoenix is receiving 50 to 60 rail cars weekly from Los Angeles. That traffic was formerly handled by truck.

After Safeway power equipment picks up the containers from the Santa Fe rail yard and transports them to the Safeway warehouse, the supermarket chain has free use of the containers for five days. And they are unloaded at Safeway's convenience without paying the spotting fee usually applied by carriers for customers holding trailers. Safeway often unloads a unit one day, then uses the container for deliveries to some of its stores in his district and then pulls the container to a shipper to pick up a backhaul for the railroad.

• according to North American Van Lines' Maxfield, his company and his major competitors are using rail to handle the peak summer season traffic, when moving company volume doubles from 2,000 to 4,000 loads a week. This is an owner operator business, and household goods movers can't come up with a bunch of extra drivers to handle the increased seasonal traffic.

The explosion of trade with other nations has fostered the growth of intermodalism.

Over the past two decades, much off-shore manufacturing centered in Japan, Korea, Taiwan, Hong Kong and, more recently, the Philippines. Goods produced in the Orient used to be shipped by vessel via the Panama Canal to reach North Atlantic ports in the U.S. and the rich East Coast markets.

In the early 1970s, however, ships with goods produced in the Far East began docking in increasing numbers at Pacific Northwest and California ports. Their containers were then railed to the East Coast. Use of this land-bridge option cut transit time from the Orient to New York by as

much as two weeks. And steamship lines were able to increase the productivity of their ships.

By 1980, more steamship lines had adopted this practice, which accelerated the coast-to-coast double-stack train service in 1984.

The weakening of the dollar and the re-industrialization of America has allowed U.S. manufacturers to rebound and increase exporting. But that change should only create some shifts in traffic patterns of intermodal movements, not total volume, according to the U.S. Commerce Department.

Two factors that have enhanced the growth are double-stack trains and electronic data interchange (EDI).

Steamship lines created double-stack trains—containers stacked two-high on a chassis. Initially, use of double-stacks was essentially limited to moving imports inland, west to east. But their real potential lies in domestic traffic. Currently, double-stack service holds just 11% of the intermodal market, but its share might reach "15% by the early 1990s," predicts S&P's Klein.

EDI has been been widely adopted by the shipping and rail industries. On Conrail, EDI provides shippers with instant status reports on shipments through their own computers, via Conrail's voice-activated telephone tracing system or through the third party EDI network.

The downside

If intermodalism is to have a major impact on commercial transportation in the decades ahead, several problems must be addressed. They include:

• Many shippers say the railroads haven't acquired enough of the 48-ft-long trailers truckers prefer for highway movements. But rails claim that most 40-ft-long trailers weigh out.

Michael Bruns, president of Comtrak, a Memphis-based carrier that provides both drayage and TL fleet service, claims the numerous options—double-stacks, 48-ft and 53-ft-long cars—have generated "a reluctance among railroaders to order new equipment. They are waiting to see what the ultimate state-of-the-art will be. In the meantime, the old cars are starting to wear out, and they're not being replace."

• Without labor cost reductions, piggyback service can't begin to compete effectively with TL carriers for hauls of less than 800 miles, says S&P's Klein. Consequently, the average intermodal haul is 1,150 miles, versus about 500 miles for typical TL movements.

While the typical rail operating crew consists of four persons, adds Klein, the rail unions have allowed piggyback trains to use two-person crews in certain instances. The crew-size exception has allowed Southern Pacific, for example, to capture short-haul traffic formerly handled by truck.

With double-stacks, the linehaul saving advantage is "about 60% over conventional TOFC because the same labor input is spread over twice as much freight," according to Klein. Those savings are negated by heavier terminal, handling and drayage expenses for double-stacks, cutting the cost advantage by about half.

However, economist Brian Freeman wrote in a report for the Railway Labor Executives' Association: "Labor costs are neither the primary cause nor even a substantial cause of the rail industry's current situation, nor are they its salvation."

Freeman argued that railroads are treating their operations as "cash cows," using the funds generated from rail operations to diversify into non-railroad ventures.

If the industry had an opportunity, it wouldn't reinvest labor-cost savings in rail operations, said Freeman. Instead, the savings would be siphoned to non-rail investments with potential for higher returns.

"On average, rail employees are at or below market wages for jobs that involve comparable skills and working conditions," concluded Freeman.

Currently, double-stack service holds just 11% of the intermodal market, but its share might reach "15% by the early 1990s," according to Standard and Poor's Stephen Klein.

Government Factors

The "Decade Of Uniformity"

If just a few current efforts succeed in creating greater standardization of interstate rules and regulations, the 1990s could become the decade of uniformity for the trucking industry.

State regulators have realized they can save billions by establishing common bureaucracies for registering, taxing and governing the trucking industry. And the centralized systems will save carriers billions in administrative and compliance costs.

By the middle of the next decade, nearly every state is expected to belong to the International Registration Plan, a reciprocal program for registering interstate motor carriers.

Industry sources predict more than half of the states will be members of the International Fuel Tax Agreement, a cooperative for distributing fuel taxes to states where trucking companies have operated.

While Congress has opted to allow states to develop improvements in state economic regulations, the federal government has begun considering preemptions to state safety regulations. The Motor Carrier Safety Act of 1984 requires the Federal Highway Administration to study state safety regulations that may pose undue costs or hardships for interstate carriers.

Specifically, FHWA was ordered to review state laws affecting interstate motor carriers, and then notify states of regulations conflicting with federal law. The review is a first step toward uniform regulations nationwide for the industry.

As a first step toward complying with the mandate, a 15-member panel of industry, consumer, labor and safety representatives recently reviewed every state regulation affecting the operation of interstate trucking. The panel was ordered to identify state regulations that were incompatible with existing federal regulations.

4,380 prospects for preemption

In order to review 73,000 regulations, the FHWA paid a contractor

Continued

$500,000 to collect and enter each of the state laws into a data base. The result—a 4-ft high printout of every state law affecting interstate motor carriage.

Using a computerized system, the FHWA panel initially determined that more than 29,000 state regulations were incompatible with federal law. Of the 73,000 regulations adopted by the states, 34% were less stringent than comparable federal regulations and 6% were more stringent. Nearly 17% had no comparable federal law or affected intrastate carriers only, and 43% were essentially the same as federal.

Focusing on incompatible rules, the panel quickly discovered a pattern in the differences between the state and federal regulations. For the most part, the less stringent state regulations provided "singular exemptions" for certain types or classes of carriers. For example, many states exclude private carriers from certain motor carrier regulations.

In other cases, the regulations were less stringent because the states adopted the entire federal code affecting motor carriers, but failed to update their regulations as the federal code was changed.

Panel members don't expect the states to balk if asked to beef up or update these less stringent regulations to comply with the federal standards. That leaves the panel to rectify the 6% of the state regulations—roughly 4,380—that are more stringent than comparable federal laws.

Congress mandated that states with more stringent rules must adopt federal standards unless the state can demonstrate that the stricter rule provides additional safety benefits and does not add undue costs to interstate motor carriers.

Aiming to eliminate bottlenecks at weigh stations, like the one shown above, federal and state initiatives will streamline state laws and regulations, thereby reducing productivity barriers to efficient trucking.

"It's tough to prove or disprove safety benefits," said Joe Toole, who is managing the project for the FHWA.

The panel's findings are currently being provided to governors in each state for their comments. Depending on the governors' responses, the panel then will forward a recommendation through the Secretary of Transportation back to Congress on whether preemption is called for in order to resolve the conflict in regulations.

Uniform safety regulations

The decision to preempt state safety regulations that conflict with federal regulations is scheduled to be considered by 1991. Based on the governors' responses, the DOT Secretary will make recommendations to Congress at that time.

Once uniform regulations and procedures are developed, the federal and state governments will begin trying to establish uniform enforcement standards. They won't have to look farther than their Motor Carrier Safety Assistance Program.

The MCSAP network was formed to administer federal funds used for state motor carrier enforcement efforts. Interaction among the dozens of state MCSAP coordinators can "fill the voids and provide oversight" as states progress toward uniform regulations and enforcement procedures, Toole said.

In the truck inspection arena, efforts by MCSAP and the Commercial Vehicle Safety Alliance have led to a uniform inspection criteria for placing vehicles out of service, and for auditing motor carrier operations and safety efforts.

This year more than 1.5 million roadside truck inspections will be completed, primarily by state and local regulators.

By adopting uniform procedures and guidelines, the message that

MCSAP and CVSA are sending out is "there is one unified motor carrier safety program managed by federal, state and local governments," said John Hibbs of the Federal Highway Administration.

The combined efforts also are improving state and federal efforts to inspect carriers' operations. Through late 1988, 125,000 of the estimated 180,000 carriers in the U.S. had not been audited.

While state officials through MCSAP completed 25,000 audits this year, the FHWA identified 20,000 carriers it was unaware of, giving the auditors a net gain of 5,000 audits this year. More than 13,000 carriers were identified because they called to request a census number.

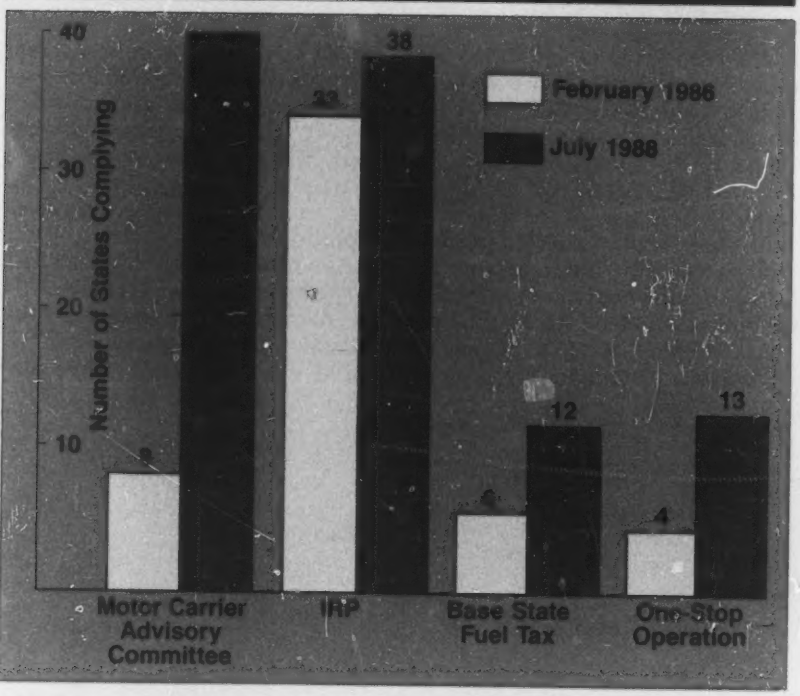
During the audits, 10% of the carriers were rated unsatisfactory and 35% received conditional safety ratings. The safety ratings will affect insurance rates and shipper decisions to use a carrier, Hibbs said.

In the future, local governments will be asked to join the audit efforts, and by 1993 state and local governments will conduct all initial safety audits, FHWA will follow up unsatisfactory and conditional ratings with carrier reviews.

While the cooperative state efforts will save interstate carriers billions in administrative costs, the new-found uniformity also may yield some political benefits for states trying to retain their privilege to regulate trucking economically.

In many states, the truck inspection criteria adopted for interstate carriers will be adapted for the intrastate carriers. Few states will expect enforcement officials to maintain two "rule books" for trucking companies.

STATE PROGRESS COMPLYING WITH CONSENSUS AGENDA RECOMMENDATIONS



While never soon enough, this chart shows good progress against objectives in a four point NGA effort to improve uniformity of state procedures. In 1986 the National Governor's Association endorsed four recommendations to simplify motor carrier tax collections. The NGA first established Motor Carrier Advisory Committees in each state, consisting of representatives from state agencies having motor carrier programs and all segments of the motor carrier industry. The plan was to develop simple, uniform registration and taxation procedures for trucks and buses. The second goal involved the International Registration Plan (IRP). The IRP allows motor carriers to travel in member states with one IRP license plate and cab card. The home state collects registration fees due all states, and distributes those fees to the other states. The third objective was to simplify the fuel use tax reporting system. Two base-state fuel use tax agreements exist, the International Fuel Tax Agreement (IFTA) and the Regional Fuel Tax Agreement (RFTA). Under each, motor carriers register with and report their fuel use to their home state, display a single decal and carry a single cab card. Instituting a simple "one-stop shopping" office for motor carriers was NGA's fourth objective. This would establish a single office in each state where motor carriers can directly apply and receive all required credentials and pay taxes.

A "win-win" situation

As state officials begin working together on uniform regulations, some also are finding ways to reduce the bureaucracy that tracks truck registrations and mileage to collect taxes.

As a result, truckers in the late 1990s will be able to travel more efficiently into and out of those states in the West that will share ports of entry. Arizona and Utah are breaking ground on the first joint port this spring, and Arizona expects to open five such ports shared with neighboring states.

The shared ports will be good for trucking, because it will make travel more efficient and improve the uniformity of procedures among states.

The shared facilities also help the states reduce administrative costs in the coming decade. State attorney generals are still working on questions of liability and juris-

Continued

diction. States still must resolve questions dealing with truck inspection and enforcement based on conflicting regulations.

In addition to becoming uniform, truck inspections will become more tolerable for truckers in the 1990s. The Commercial Vehicle Safety Alliance has become a forum for sharing concepts in commercial vehicle enforcement, including ideas for improved inspection sites.

Oregon weighmaster Doug Gyllenskog sparked interest in his state's indoor inspection facilities, which have increased inspection productivity by 40%. The facilities incorporate ideas gleaned from California facilities that feature in-floor lighting.

The improved facilities reduce tension among drivers by providing a more professional atmosphere for the inspection. Drivers put out of service also have a more comfortable facility with rest rooms and food available while waiting for repairs.

Accident data at a bargain

While federal and state regulators push for uniform regulations that will streamline tax collection and, potentially, save the trucking industry billions, truckers may get more than they bargained for—accurate data on the causes and effects of truck accidents.

Since the invention of the automobile and the advent of the truck, highway accident statistics have never accurately portrayed the extent of property damage, injuries and deaths linked to accidents involving heavy trucks.

"There is no national data base that provides reliable, uniform, comprehensive information" on truck involvement in highway accidents, said Ralph Craft, motor carrier projects manager for the National Governors' Association.

The problem is compounded by lack of communication between state bureaucracies, different levels of training among police officers and difficulties in obtaining detailed data from the accident scene.

In general, 10% to 20% of all accident reports are filed by state police. The remainder are filed by local police, who tend to lack the detailed training of state troopers, Craft said.

Budget constraints also hamper efforts to obtain accurate accident information. Preparing accident reports is not a top priority of police already facing a burgeoning workload, and funding is not available to train state and local police officers on the intricacies of accident reporting.

As a result, federal accident data is spotty and incomplete. The Department of Transportation's Fatal Accident Record System (FARS) is based on incomplete and incom-

OUT-OF-SERVICE RATE PER INSPECTIONS

	INSPECTIONS	VEHICLES O-O-S*	DRIVERS O-O-S*
84	158,730	49,604	9,273
85	373,374	107,583	23,695
86	559,300	218,144	43,117
87	1,003,794	368,188	57,654
88	1,200,000 (projected)	400,000 (pro)	61,000 (pro)
89	1,500,000 (projected)	500,000 (pro)	68,000 (pro)

*Out-Of-Service

While the number of truck inspections has risen each year as more states join the MCSAP program, the number of out-of-service vehicles and drivers as a percentage of inspections remained constant. Federal officials expect that trend to continue in the 1990s. The 1988 and 1989 numbers are projections from DOT and CCJ.

patible state records, and does not capture nonfatal accident statistics.

The broader National Accident Safety Survey (NASS) is a compilation of randomly selected accidents. Statistics generated by the NASS data are based on a small sample of total highway accidents, and typically include few accidents involving trucks.

And Motor Carrier Safety Management Information System data, based on federal MCS 50T reports, is incomplete and under-reports accidents.

The effort to compile an accurate picture of truck accidents by independent researchers, such as the University of Michigan Transportation Research Institute, are hampered by the incomplete data. UMTRI studies, for example, are based on FARS and the MCS 50T reports.

As a step toward uniform reports, the NGA formed a technical advisory group to determine the type of information that should be reported. The group also simplified the method for determining if an accident is reportable.

The old method required a dollar estimate of damage to the vehicles, something difficult to estimate with any consistency. Under the NGA system, an accident is reportable if there was an injury, fatality within 30 days or one of the vehicles involved had to be towed away from the scene.

The group developed a report form with 13 data elements and a proposed two-tiered accident investigation strategy. The 13 data elements cover the basic details of the accident, including road condition, driver condition, vehicles involved, road configuration.

Collecting information on each of these 13 data elements is the first tier of the reporting system. The second tier involves collecting more detailed information to study accident causes and try to uncover patterns linking accidents to more detailed factors such as type of carrier and type of load.

Accidents would be selected randomly for further investigation by a more experienced accident investigator, and these results would supplement the basic data collection efforts.

A pilot study in five states ended Sept. 30, and NGA is analyzing the results. The study compiled 3,800 accident reports on the new NGA forms, and surveyed officers individually and in focus groups to determine their reactions to the form. The study was conducted in Illinois, Michigan, Minnesota, Ohio and Wisconsin.

NGA will develop a policy statement on adopting the forms at its Winter meeting in 1989, possibly leading to the first national, uniform truck/bus accident reporting system early in the 1990s. □

The Right To Tax

"The governors will, of course, fight any attempts by the federal government to preempt state taxation procedures," said Ralph Craft, National Governors Association motor carrier project manager, in a speech late last year.

To retain their traditional rights of taxing motor carriers, the NGA is pushing a consensus agenda, calling on states to join base-state fuel tax agreements and the International Registration Plan, establish motor carrier advisory committees and open one-stop registration centers.

In return for the simplified procedures, states should not be preempted by Congress from regulating carriers, according to the NGA agenda.

"But we will not be able to successfully defend the states [in Congressional hearings] if the industry brings in pictures of credential laden trucks" or mounds of paper required to obtain those permits, Craft said.

The states' efforts will demonstrate a commitment to reducing the bureaucratic maze facing truckers. "We cannot expect to be taken seriously [in Congressional hearings] if we cite as progress the reduction of required truck credentials from 107 to 100," Craft said.

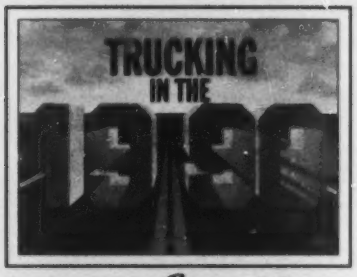
Programs Hit Paydirt

In addition to promoting uniform regulations, the FHWA has funded several programs expected to improve highway safety in the 1990s. In Wisconsin, a study noted that inspectors' increasing familiarity with log books is raising the number of drivers put out of service.

Officials in Illinois and Oklahoma have developed successful drug-interdiction programs. Oklahoma MCSAP officials used part of a $1.25 million drug enforcement assistance fund to set up a drug program recently credited with nabbing a truckload of marijuana worth $1 million. And states have learned to coordinate efforts by running joint "sweeps" or concentrated inspection efforts.

Connecticut worked on a procedure for verifying that repairs were made to inspected vehicles with defects.

Utah has published a MCSAP newsletter to promote communication and share ideas among state officials. Arkansas developed a carrier education program. Idaho, Montana and Indiana also are reporting that accidents are down since MCSAP was put in place, and that is the top objective of the MCSAP program, Hibbs said.



Equipment Considerations

The Cab & Chassis

"We must not lose sight of the cost effectiveness of technological advances," said Keith Lewis, executive engineer, Ford Heavy Truck Design, at a recent Society of Automotive Engineers meeting. Since it takes time for new technologies and designs to be proven cost effective, changes will be slow and incremental; evolutionary rather than revolutionary.

Here's a look at some evolutionary insights that you probably will consider as you anticipate purchasing equipment within the next few years.

Configuration

"We'll see broader use of multiple trailer combinations and setback front axle tractors will predominate."

That's Peter Wolsdorf, vice president, engineering, Freightliner, who believes proposed legislation to allow higher vehicle weights will eventually be approved, but individual axle weights will not increase.

Brian Wheeler is product planning manager at Volvo GM Heavy Truck Corp., Greensboro, N.C. He expects to see increased use of high cabovers. "There are two reasons for this. First, design changes to the high COE will remove some objections to its use. Second, the 53-ft semi-trailer is gaining in popularity.

"High-COE sales reached 41% of the Class 8 market during 1982," he adds, "and steadily declined to 17% in 1987. We expect this trend to reverse with sales reaching approximately 22% in 1992."

"In order to retain profitability," says Wheeler, "many less-than-truckload carriers have changed to a hub-and-spoke, short-haul type of distribution system. This strategy favors a trend to a nonsleeper, conventional, low-cost tractor which can, on occasion, be used for long haul between hubs."

On the other hand, Freightliner's Wolsdorf maintains, efforts to cut corners on linehaul tractors may be offset by the alleged driver shortage, which is inducing some motor

Continued

carriers to provide more amenities to attract and retain drivers.

Drivetrains and synlubes

Radical change is unlikely in transmissions, drivelines and rear axles for at least a few years. For instance, synchronized gearboxes, though widely enjoyed in Europe, are not likely to make significant inroads in the U.S. heavy truck market. The reason, according to Tom Dickson, director of technical activity, Dana Corp: "For a synchro transmission to reliably handle the same amount of torque as a nonsynchro unit, it has to be larger, heavier and more expensive."

Likewise, automatic and automated transmissions pose no immediate threat to nonsynchronized, manual gearboxes, at least in heavy-duty applications. Medium-duty, however, could be a different story.

"I think we'll see more automatics there," says Dean Stanley, Navistar's vice president of engineering. "With a shortage of drivers, you're going to have an unskilled pool from which to choose. An automatic in a stop-and-go operation will save the transmission and make the engine do what you want it to."

This Mitsubishi Fuso MT-90X "truck of the near future" illustrates the increasing evolution toward factory-integrated aerodynamics, with less added on by users or dealers. Mitsubishi claims MT-90X has a drag coefficient of 0.38.

Also, niches like refuse work—traditionally well-served by automatics—will persist. Bob Denes, Eaton's general manager, Drivetrain Systems Div., predicts that use of automatic and automated transmissions will increase. He also cites advantages of automated compared to automatic transmissions.

Expected to be available in the U.S. within a few years, automated transmissions are unlike conventional automatics in that one does not use a torque converter or planetary gear sets. It is essentially a manual transmission that uses electronics and pneumatic valves and slave cylinders to do the work of shifting and clutch engagement/disengagement.

To a driver, an automated transmission *feels* like a conventional automatic but with some advantages. According to Denes, advantages include less heat, eliminating the need for a transmission cooler in a vehicle's radiator; more available gear ratios than conventional automatics; and parts commonality with manual gearboxes.

Apart from taller gear ratios needed to accommodate smaller-diameter, low-profile tires, not much will change in drive axle design or configuration. Despite the popularity of single drive axles in Europe, the tandem will remain popular on this side of the pond.

"Tandems show no signs of diminishing in favor of single rear axles," says Freightliner's Wols-

dorf. "Except where doubles combinations replace the traditional five-axle tractor-trailer. With the potential of higher gross weights being allowed, tandem axles will remain strong."

Although transmission and drive axle design won't change much, lubricants used in them will increasingly shift from mineral-based to synthetic. According to Joseph Mann, manager, vehicle engineering for Navistar: "The future will see axles and transmissions with a factory-fill of synthetic lubricant."

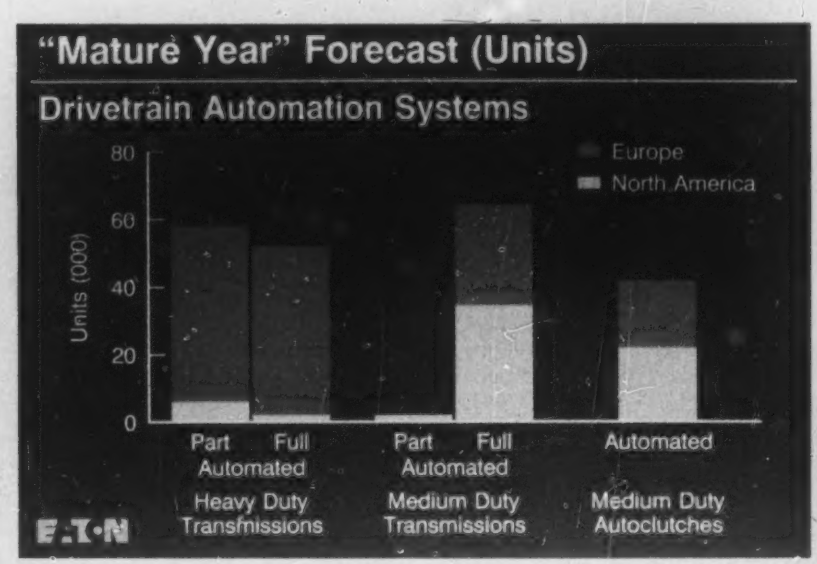
The once-questionable benefits of synthetic lubricants, in time, have become well-documented. They are more stable and less prone to oxidation and breakdown at high temperatures and offer improved cold starting capability. Thus, synthetic lubes keep internal parts cleaner and reduce wear rates. They may also provide modest increases in fuel economy and allow extended drain intervals.

Many users have questioned the value of synthetic engine oils, since they're expensive and, in engines, make-up oil is a big factor. But there is little doubt that synthetic gear lubes are cost efficient.

Jim Cade, manager-maintenance/technical for Ryder, has been using synthetic lube in transmissions and drive axles. "We've extended our drain intervals from 100,000 miles to life [500,000 to 600,000 miles]," Cade told CCJ. "The axles and gearboxes run cooler and exhibit no more wear at teardown than those run on mineral lubes and drained every 100,000 miles."

Since reduced maintenance requirements and improved component longevity are key factors in reducing the bottom line, synthetic gear lubes appear to be a shoo-in.

Drive pinion from Rockwell SQHD rear, after 196,000 miles on original fill (after break-in) of synthetic gear lube. Transmissions and axles will be factory-filled with synthetic lubes by mid '90s.



"Although it's impossible to pinpoint," says Bob Denes, general manager, Eaton Drivetrain Systems Div., by the late '90s or early 2000s, the fully automated transmission could reach product maturity (sales curves flatten out). Sales could top 60,000 units annually in the medium-duty segment, more than half of those for North American users. By contrast, automated penetration into the heavy-duty segment will be slight.

Cab, corrosion, driver environment

Many say the cab of the '90s is pretty much here, but at least one manufacturer is saying: "You ain't seen nothing yet."

Aerodynamic bodywork has conclusively shown its value in increasing fuel economy and reducing splash and spray. Major advances in this area have already been made. Over the next few years, look for fine tuning—like

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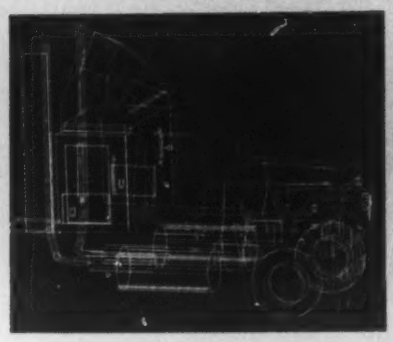


airflow management to keep lights and mirrors clear, to cool brakes, transmissions and axles, and to reduce crosswind effects.

As more miles are logged, and as the science of truck aerodynamics becomes more precise, look for air dams, roof and side fairings, to become more integrated at the OEM level, and less often added-on by operators and dealers.

Although a totally corrosion-proof cab is an elusive dream, cabs are being made ever more resistant to corrosion.

"When it comes to using exotic, corrosion-resistant materials, trucks are already well ahead of passenger cars," asserts Navistar's Stanley. "We've been using aluminum extensively for years, and sheet-molded compound is now common on trucks. These materials, as well as steel, will persist over the coming years."

Improvements in occupant protection will include upgraded restraint systems, such as standard 3-point safety belts and air bags, and standards for injury-producing parts within the cab, as well as for cab integrity.

"Users are asking for the inviolability of the occupant's survival space in crashes and fires," says Volvo GM's Wheeler. "Interior materials having minimum fire risk will be included, being difficult to ignite and self-extinguishing."

"Drivers deserve a better shake in tomorrow's truck," maintains Ed Mabley, manager of heavy truck product development at Ford. "And they are going to get it." Mabley cites diverse improvements available for drivers in the coming years, including:

- roomier work space;
- smoother ride;
- more responsive steering, handling and braking;
- better steps and handles;
- improved visibility through larger windows, better mirrors, and possibly even remote TV and proximity devices;
- lower interior noise levels.

Tom Brooke, president of Frederick Transport, led the first carrier launch into satellite operations with Sony Wayfarer hardware and Geostar linkup. By the 1990s, this innovative and bold communications strategy may become commonplace as more and more shippers urge the increasingly competitive long-haul carriers to make the investment in satellite operations in order to keep their business.

This last quality of future cab design may be aided by the burgeoning science of electronic noise attenuation. Technology is available to produce "anti-noise" that's capable of quieting any loud, repetitive sound—like that made by a diesel engine (Would you believe an electronic muffler?, CCJ, July '88, page 76).

Noise Cancellation Technologies Inc., Great Neck, N.Y., has announced that its "SilentSeat"—a seat with built-in speakers that broadcast anti-noise—will be available for heavy trucks later this year.

Electronics

Vehicle tracking and recording devices will see more widespread use in the '90s, providing management with real-time information about vehicle location and operation. It's likely that they will also become more of a driver's friend, providing weather information and, perhaps, even up-to-the-minute height measurements of upcoming bridges (How high is that bridge ahead?, CCJ, August '88, page 33).

"We think that on-board recorders and satellite communication devices will be common by the end of the '90s," says Freightliner's Wolsdorf. "These may also include such devices as active suspensions and automatic tax reporting for weight in motion. Traffic control devices on the highways and in cities, for smoothing traffic flow, and electronic navigation devices will be in general use."

Instruments and controls will be designed and laid out with utility

the foremost consideration, following TMC recommendations for configuration and placement. The customer preference for analog gauges over electronic/digital clusters is expected to continue. Freightliner's Wolsdorf notes: "The electronic dashes we have seen so far have not provided enough value for the customer to be widely accepted."

Drivers likely will soon employ electronic anti-lock brake systems (ABS) and wheel-spin controls. Many government soothsayers believe ABS will be mandated by the mid-1990s, but the legislation is not expected to recreate the problems of the '70s.

New anti-lock systems have already demonstrated their superiority to earlier equipment. Advances in digital electronics, improved resistance to electromagnetic and radio-frequency interference and better environmental insulation have gone a long way toward ensuring durability and reliability in today's anti-lock systems (Getting ready for anti-lock, CCJ, Jan. '89).

According to Ford's Mabley, steering also will benefit from the electronic revolution. Speed-sensing steering (sometimes referred to as variable-assist) like that found on some late-model passenger cars, will increase steering effort on the Interstate for better high-speed road feel, but deliver more power assist at lower speeds in the city, for better maneuverability. And it's just around the corner on heavy trucks, Mabley said.

Electronic devices like electronic engine computers, driveline controls, anti-lock systems, trip recorders and satellite communication devices will have the ability to communicate with each other and with remote devices, thanks to the establishment of SAE Standards J1708 and J1587. These define data "language" standards for microprocessor-based vehicle systems. They also will ultimately afford the capability of diagnosing various systems, regardless of brand, with a single tester, through a standard, off-board diagnostic connector.

"We'll see more standardization in diagnostics," says Freightliner's Wolsdorf, "as was recently announced by Freightliner, in conjunction with Caterpillar, Cummins and Ryder (see CCJ, Jan. '89, page 9)."

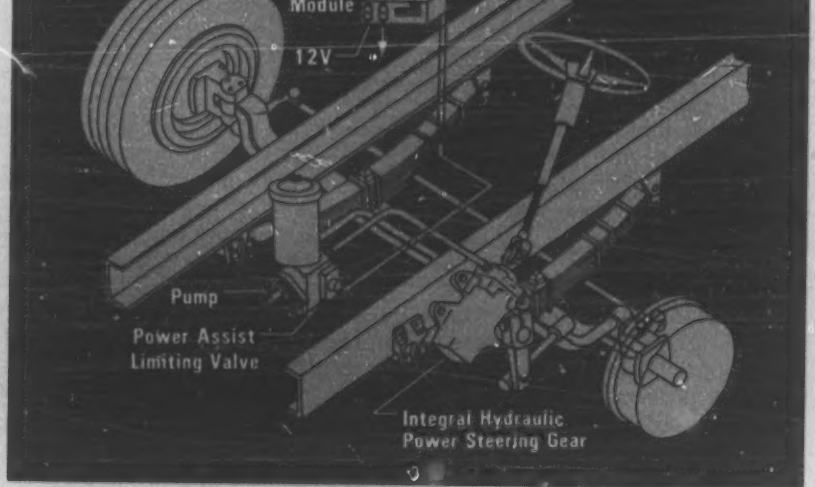
Most electronic devices will have some degree of self-diagnostic capability, adds Wolsdorf, "And they will also assist in diagnosing other vehicle problems. Components will be of a remove-and-replace nature."

Navistar's Stanley believes multiplexing in common electrical systems (lighting, for example) is coming. In such applications, control signals for a number of different loads could be carried along a single wire or fiber optic strand, eliminating the weight and complexity of multiple wiring harnesses. "It will come slowly, driven from the passenger car base," says Stanley. "We'll probably see some small form of it in the '90s."

Clearly, those who work on this equipment will need to be highly trained with advanced skills in diagnostics—both mechanical and electronic.

"This will place a huge responsibility upon manufacturers, dealer organizations and fleets, to train and retrain a new breed of maintenance personnel," says Ford's Mabley.

"Technology will lead us to improved equipment output, but there is already a price to be paid in the need for competent maintenance."



Ross/TRW speed-sensitive steering for linehaul vehicles reduces power assist as vehicle speed increases, for improved road feel. And at low speeds, assist is increased for greater maneuverability.

Wheels, tires, suspensions

Expect to see smaller wheel diameters, expanded use of hub-piloted systems, larger market share for disc wheels over spoke, stan-

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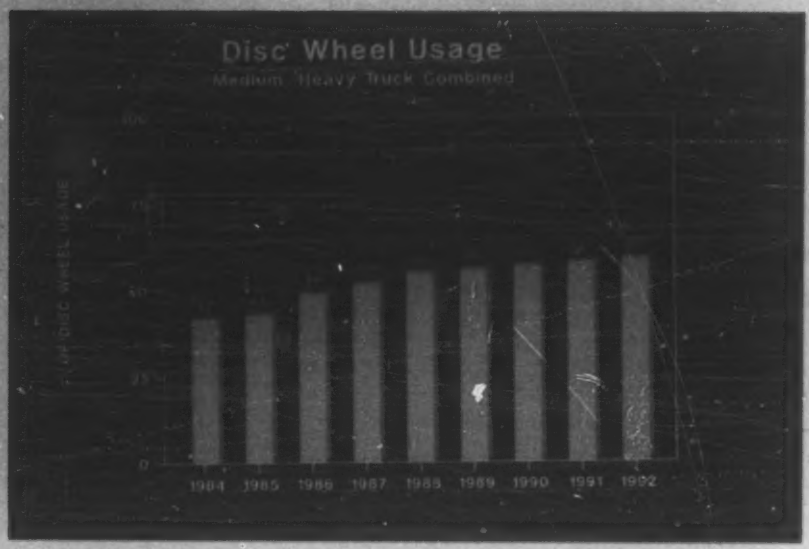


Disc wheel market share will grow more slowly into the '90s—trailers will remain strong on spoke wheels.

dardization of sizes and modest increases in the use of wide-base or super-single tire/wheel systems. In other words, expect to see current trends continue.

Bill Kozyra, chief engineer for Budd, expects to see 19.5- and 17.5-in. wheels in the '90s.

"The industry would like the smallest wheel possible to reduce trailer floor height, allowing an increase in cube and more productivity potential," he says. The obvious impediment is that you can only get so small before running into packaging and brake cooling problems. Kozyra sees the downsize shift first to 19.5-in. and, eventually, to 17.5-in.

Bill Noll, manager of product quality for Accuride confides: "All of our programs are toward downsizing (from 22.5 in.) to 19.5-in. and 17.5-in. on large trucks and 19.6 x 675 for mediums." He feels the trend toward disc wheels will slow down a bit in the '90s.

"Our projection for 1992 is 59% nondemountable (disc) wheels. One of the reasons holding back the conversion is that trailers still use a lot of demountable rims. We project a big increase in hub-mounted or hub-piloted tubeless wheel sales."

Robert Smith, manager, field engineering for Motor Wheel, agrees with most other industry experts that hub-pilot mountings—both 8- and 10-hole—will continue to grow at the expense of spoke and old style disc wheels.

It is likely that what's left of the tube-type wheel/tire market will be in P&D, metro operations, where sidewall damage is perceived to be more of a factor.

In a move intended to aid globalized truck component sourcing, the Society of Automotive Engineers (SAE), in May 1988, revised Standard J694 to define wheel mounting systems in accordance with the methods of the International Standards Organization. This and similar moves will help suppliers improve design interchangeability and reduce costs on a global scale.

One big question for the 1990s is about the growth of wide-base or super-single tire/wheel systems. The primary advantage is that super singles weigh less than the duals they replace—a couple of hundred pounds less per vehicle, other things being equal. Combined with wide-base aluminum wheels, the weight saving looks even more attractive for applications where weight limits are typically reached before volume capacity.

Perceived disadvantages involve on-the-road tire failure and reduced roll stability (an axle's track is narrowed when duals are replaced with super singles, and wheel offset is not changed).

"I see super singles as filling a specific, vocational niche," says Dave Laubie, engineering director for Bridgestone.

One area of improvement that could help *prevent* road surface and cargo damage is suspensions.

Frank Stevens, vice president, marketing, Hendrickson, said: "Air ride will reach a market share of 40% to 50% in the '90s, up from 25% to 30% today."

The shift to air ride is being eased a bit by price reductions (relative to the price of a truck), maintenance requirements becoming comparable to those of spring suspensions, and the desire for improved ride quality. In addition to driver comfort, sheet metal fasteners, hoses, wiring harnesses, connectors, light bulbs and fragile cargo benefit from reduced vibrations.

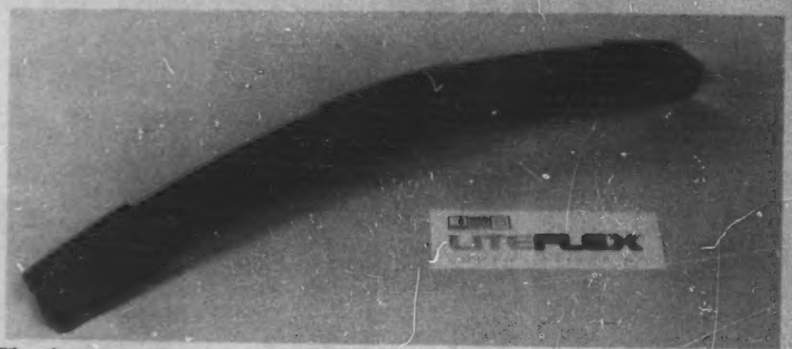
But the durable leaf spring will not be left in the air ride's dust. Future steel-spring suspensions should provide a better ride than today's springs, as engineers take advantage of stronger and lighter materials. More precise control of

heat treating has resulted in higher stress levels that will extend spring life to two to five times that of conventional springs.

Since new alloy spring steel can handle substantially higher stresses, pound for pound, spring assemblies will be lighter and more durable. In some cases, new two-leaf springs are replacing three-leaf springs, outlasting them and providing a better ride.

A development to watch is the composite leaf spring. A composite spring is made from a matrix—usually some sort of fiberglass or carbon fiber—held together with a plastic resin. The advantage of this spring is that it is lighter than a steel spring of identical load rating. Disadvantages include a premium cost and a tendency to delaminate.

Dave Richard, assistant project engineer, Inland Div., GMC, claims: "Our composite spring weighs 17½ pounds and matches loads with a steel spring weighing 65 pounds.



Fiberglass composite springs weigh ⅓ to ¼ as much as steel springs of the same capacity. Unfortunately, they're also five times more expensive, and are sensitive to heat. Look for limited use in the mid to late '90s, as these problems are overcome.

"Bulk operators tell us they can get a payback on this spring in two to three months," Richard continues. "But other carriers will not easily be sold a premium product like the composite, except perhaps from a durability angle."

Durability, according to Richard, has been validated at 200,000 cycles, with a long-term projection of more than 1,000,000 cycles. Testing was performed in accordance with the Truck Trailer Manufacturers Association room-temperature fatigue test guidelines, wherein the springs are stroked to 1½ times their working travel. A steel spring, says Richard, will go about 200,000 maximum cycles.

Another potential advantage of composites is referred to as the soft failure mode. Spring failure is telegraphed by fibers protruding from the spring. Eventually, the vehicle sags to one side. If the composite spring fails beyond the protruding fiber stage, the spring tends to splinter and separates longitudinally. When that happens, 70% of the rated capacity is lost, but the spring acts like a soft steel spring rather that a broken one.

Drawbacks to composite springs include a delamination tendency when exposed to temperatures over 200°F. Another is cost—an estimated five times that of steel springs. "It's possible that we'll see composites used in the '90s," speculates Navistar's Stanley. "But trucks will never create the necessary volume infrastructure needed to bring down the price." [Its] success...will be first driven by passenger-car acceptance. □

Low-profile popularity will continue to grow with cube-conscious haulers, especially 19.5-in. and 17.5-in. sizes.

CHILTON'S

JULY 1980

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TOP 100

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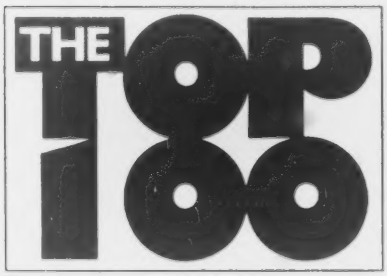
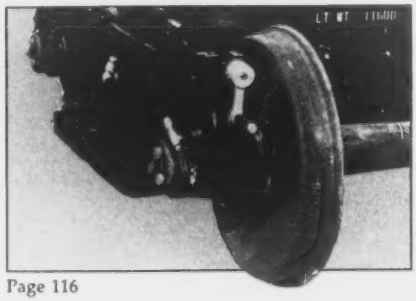
VOLUME 146 NUMBER 7 JULY 1989

TABLE OF CONTENTS

FEATURES	THE TOP 100 Financial rankings of largest for-hire motor carriers	70
	INDUSTRY STATISTICS 1988 market stats; equipment sales figures; forecasts	85
	PRIVATE FLEETS Their size by vocational groupings; equipment type	99
	THE ROADRAILER RIDES AGAIN! How Norfolk Southern railroad takes freight from trucks	116
COLUMNS	Editorial / Nobody cares about safety	9
	Washington Report / Out-of-service rates decline	53
	Business Side / Increasing role and control of brokers	57
	Safety / The horrors of annual inspections	63
	Maintenance/Technology / Ackermann steering	123
DEPARTMENTS	Reader's Forum	11
	Up Front	20
	Industry Watch	24
	Classified Advertising	163
	Advertisers' Index	167
	SideRoads	168
PRODUCTS	New Product And Services	131
	Publications	162
POSTCARDS	Truck Talk Postcards	49
	Reader Service Cards	149
	Subscription Cards	151



Page 70



Page 116

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HARD TIMES IN WISCONSIN!

Believe it or not.

As a cost cutting measure, all preventive maintenance was eliminated for two decades at the municipal fleet of Madison, Wisc. The fallacy in that logic was reiterated throughout the 20-year period in uncontrollable maintenance costs and unscheduled downtime.

That's the legacy – and the challenge – city officials presented when they hired motor equipment manager Chris Roach to turn the fleet around.

And that's what he did.

In CCJ's August issue, Roach tells how he used Statistical Process Controls to turn the City of Madison's fleet into a model for maintenance management. This is Part III in CCJ's on-going series on quality improvement techniques in trucking management. □

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Study: Brokers a boon to small fleets, shippers

By PARRY DESMOND Executive Editor 215-964-4529

The role of freight brokers licensed by the Interstate Commerce Commission was recently studied by Dr. Terence A. Brown, associate professor of transportation and marketing at Penn State University's School of Business Administration on the Harrisburg campus. The research determined that:

- Assuming that Class 1 and 2 carriers had $40 billion in total revenues in 1987 and brokers' total sales for the same year were $5.89 billion, then brokers attracted about 15% of the trucking industry's total revenues.
- Brokers typically have small businesses—75% have only one office and $700,000 annual gross sales. Although the estimated 4,250 active brokerages employ an average of 5.54 workers, for a total industry employment of 23,567, half of the survey respondents employ three or less workers.
- 60% of the respondents reported they were independently owned and operated, and 31% said they were a department or a subsidiary of a trucking company.
- Members of the Transportation Brokers Conference of America handled more LTL shipments, used more carriers and had higher sales than non-TBCA members.
- On average, brokers served 95 shippers in 1987. Typically, shippers were manufacturers that employed less than 100 people and had 20 or fewer outbound shipments a week.
- 63% of the respondents reported steady-to-rapid shipment volume growth in the past three years, and 76% project growth.
- The typical broker used an average of 179 carriers in 1987, but more than half of the respondents use 50 or less. And "brokers are more important to small (21 or fewer trucks), new, 'heavy user' carriers than to larger, older carriers." Carriers defined as "heavy users" generated more than 33% of their total business from brokers.
- 93% of the respondents said the shipper pays the broker, who, in turn, pays the motor carrier.
- Nationwide, brokers handled approximately 10.8 million truckload shipments in 1987, with an average of 2,480 loads per broker. About 60% of the brokers handled a total of 2.8 million shipments of less-than-truckload freight, averaging 1,048 shipments per broker.

The brokers claimed providing backhaul freight and reducing empty mileage were the most important benefits they provided.

Regulation started in 1935

Freight brokers were first regulated as part of the 1935 Motor Carrier Act. In the ensuing years, the ICC established a $5,000 surety bond requirement for brokers. By 1939, licenses were granted to 51 applicants, and 71 were denied. The most common reason for denying a license, according to Brown, was lack of showing a good need for the service.

By the mid-1970s, according to ICC records, there were only 70 licensed brokers, and many of those were inactive.

In the late 1970s, the ICC decided to open entry to the brokerage industry. As a result, 144 of 152 applications were approved. At the same time, surety bonds were raised to $10,000.

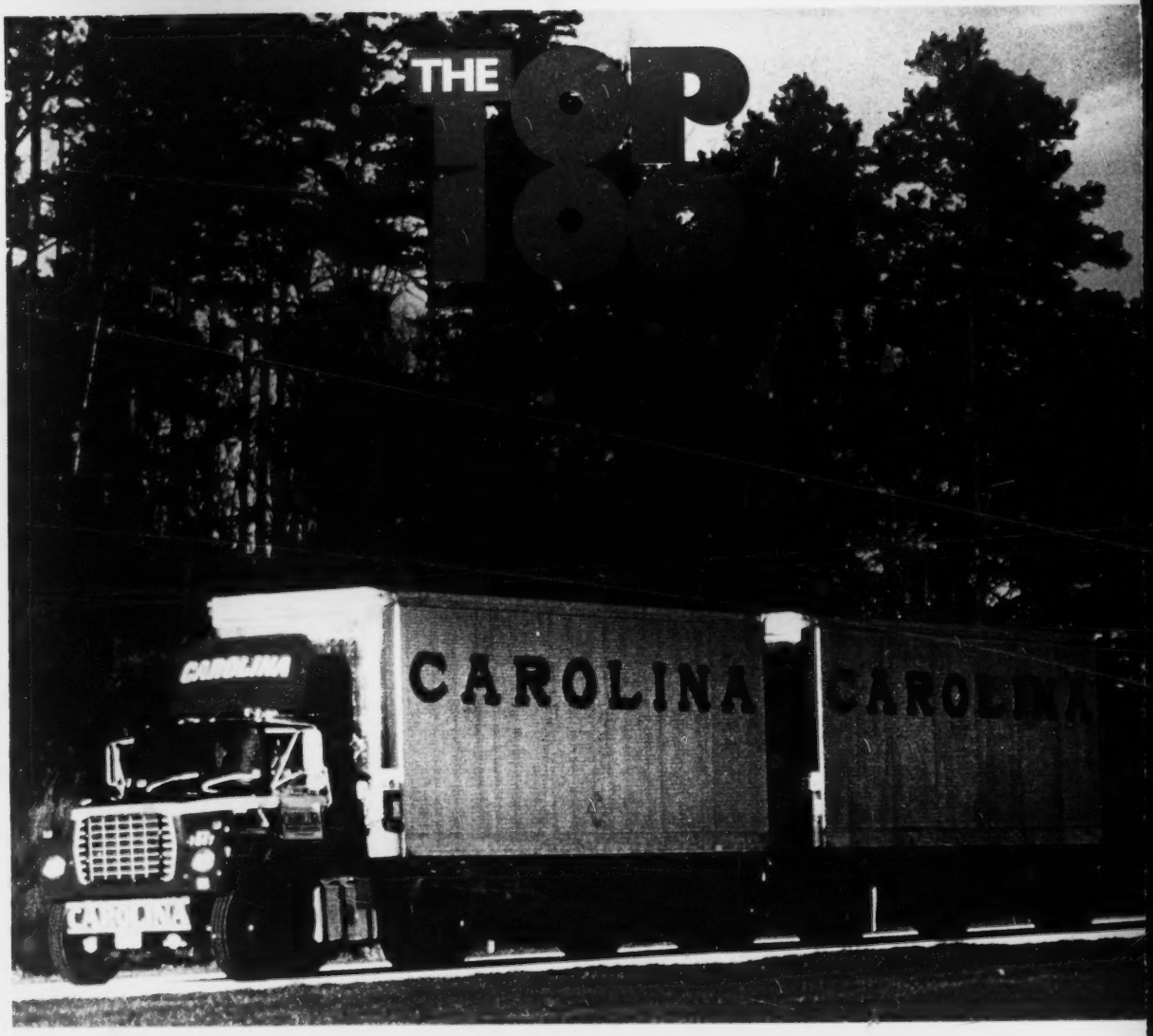
Since deregulation of the trucking industry in this decade, growth of brokers has boomed. In 1988, there were 5,900 licensed brokers; 59% of the brokerages were started since 1985.

The research project, conducted under contract with the U.S. Small Business Administration, included a survey of 1,477 brokerages—548 responding—and interviews with 60 brokers, motor carriers and shippers. □

States with Most Brokers

State	No. of Brokers
California	455
New Jersey	380
Texas	365
Illinois	360
Ohio	311
Pennsylvania	282
New York	256
Georgia	205
Missourri	191
Minnesota	184

These 10 states have a total of 2,989 broker headquarters and account for almost 51% of all brokerages, according to the study done by Dr. Terence Brown of Penn State University. Although most of the brokers are based near or are in association with manufacturing activity, New Jersey and Texas have disproportionately more brokers, perhaps because of port activity in those states.



1988: BIGGER, BETTER, BUT NO BOOMER

Gross revenues up 8.5% and a 94.8 OR. Those aggregate figures illustrate why 1988 was a good year for most of the nation's Top 100 for-hire fleets. And the four largest carriers continue to capture an increasing share of traffic, snaring 47.7% of 1988's Top 100 revenues.

By PARRY DESMOND, *Executive Editor*

Without question, 1988 was a bigger, better year for most of the nation's major for-hire fleets. That is the obvious conclusion when analyzing data accessed from carrier reports filed with the Interstate Commerce Commission.

The Top 100 enjoyed $30.5 billion in gross sales last year. That's 8.5% better than the leading common carriers' 1987 gross revenues. Total expenses for the Top 100

Text continues on page 77

Less-Than-Truckload Common Carriers of General Freight

Fleet Name, City, State	Gross Revenues	Total Operating Expenses	Net Operating Income	Operating Ratio	Interest Expense	Other Income Adjustments	Income/ Deferred Taxes	Net Income
AAA COOPER TRANSPORTATION, DOTHAN, AL	$ 116472	$ 102330	$ 14142	87 9	$ 1709	$ 6	$ 113	$ 12326
ABF FREIGHT SYSTEM INC, FORT SMITH, AR	616774	590759	26015	95 8	9000	(8051)	52	8912
A-P-A TRANSPORT CORP, NORTH BERGEN, NJ	129151	120787	8364	93 5	1673	261	760	6192
ADVANCE TRANSPORTATION CO., MILWAUKEE, WI	94977	92234	2743	97 1	1816	(48)	172	707
ANR FREIGHT SYSTEM, INC., DENVER, CO	468009	475105	(7096)	101 5	2689	(1661)	(5169)	(6277)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2982
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3484
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	12949
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	11015
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9892
CHURCHILL TRUCK LINES, CHILLICOTHE, MO	139548	133290	6257	95 5	298	437	2590	3806
CON-WAY WESTERN EXPRESS, INC., PORTLAND, OR	88799	77143	11656	86 9	563	(7)	4082	7004
CONSOLIDATED FREIGHTWAYS, PORTLAND, OR	1749180	1643352	105828	93 9	7283	9490	33851	74184
ESTES EXPRESS LINES, RICHMOND, VA	88446	74618	13829	84 4	154	733	5307	9101
G.I. TRUCKING COMPANY, LA MIRADA, CA	75001	77602	(2601)	103 5	1887	(1)	(1522)	(2967)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	294
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(3387)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(512)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	353
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	16095
NORTHWEST TRPT SERVICE, COMMERCE CITY, CO	172333	158554	13779	92 0	27	701	5383	9070
OLD DOMINION FREIGHT LINES, HIGH POINT, NC	114786	109472	5314	95 4	4333	691	663	1009
OVERNITE TRANSPORTATION CO., RICHMOND, VA	638486	555881	82605	87 1	821	9682	33717	57749
P*I*E* NATIONWIDE, JACKSONVILLE, FL	500344	506520	(6176)	101 2	11014	31976	4529	10257
PRESTON TRUCKING CO., INC., PRESTON, MD	368044	357405	10639	97 1	4929	1152	2621	4241
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	74718
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5573
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1960
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	8802
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(5327)
ST. JOHNSBURY TRUCKING CO., HOLLISTON, MA	296900	268650	28250	90 5	3422	(10383)	9291	5154
TNT HOLLAND MOTOR EXPRESS, HOLLAND, MI	181953	162983	18969	89 6	16	30	7292	11691
TNT RED STAR EXPRESS LINES, AUBURN, NY	127420	122485	4935	96 1	315	207	1935	2892
TRANSCON LINES, LOS ANGELES, CA	266061	288848	(22787)	108 6	2213	(2145)	34	(27179)
TRANSUS, INC., ATLANTA, GA	68787	68188	599	99 1	127	(856)	—	(384)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	373581
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22721
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(3297)
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2056
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1941
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	66419
TOTAL—LTL GENERAL FREIGHT	$21553011	$20462839	$1090171	94 9	$95009	$58042	$263404	$789800

[1]Average based on only those carriers reporting applicable data.

(all dollar amounts in thousands)

Net Profit Margin, %	Salaries-Officers/ Supervisors	Salaries & Wages	Fringes	Maintenance/ Operating Supply/Exp.	General Supplies & Expenses	Operating Taxes & Licenses	Insurance	Communi-cation & Utilities	Depreciation & Asset Disposition	Equipment Rents/Purch. Transportation	Tons Carried (000)
10.58%	$ 14525	$ 41042	$ 8379	$ 8950	$ 5596	$ 3550	$ 3384	$ 2103	$ 7511	$ 7290	899
1.44	65641	250307	91687	45983	50791	23623	12594	10216	28858	11058	2698
4.79	12210	50070	19073	9810	13130	2518	4115	3202	6028	632	718
0.74	7667	36081	15151	7857	4761	3130	3394	1406	2066	10720	833
(1.34)	38186	189137	75839	44745	38955	14721	12555	7962	1941	51065	3187
4.08	6151	16604	4311	6214	1745	1284	1530	1547	2558	7231	586
3.99	8115	25024	7331	4911	4668	1618	1404	1603	5914	8161	1073
2.44	50829	171511	31411	24930	21700	6541	10281	9676	26599	35488	2529
5.21	16963	44110	12316	17431	8907	6451	4417	1861	11467	1613	2421
3.19	13861	42450	11038	7441	10614	2734	4280	1479	4138	20470	4146
2.73	12882	51323	17559	14897	6033	4628	2544	2140	5908	15375	824
7.89	11456	29512	9410	6254	6917	2814	3290	1623	4652	1214	547
4.24	181166	662345	265809	181263	92930	55479	51597	23074	80022	79769	6521
10.29	8607	35769	7260	7290	3105	3237	2598	1431	4855	465	906
(3.96)	7190	25643	7150	5921	5123	2105	3473	1641	4159	15200	407
0.35	6535	19454	10134	5044	21543	2136	1702	1436	1522	8636	599
(4.70)	5990	33545	11435	4001	2744	2274	1611	1329	4712	2009	1329
(0.71)	6382	24164	4297	4824	3606	1942	1317	1447	1310	17971	514
(0.40)	6695	35670	7855	7116	3334	2661	2615	225	7163	967	
14.69	9404	47607	15617	5184	3954	1552	2431	1469	4999	787	717
5.26	17870	60333	22362	12497	19987	6347	3080	1533	350	14195	818
0.88	11842	30380	7045	10503	6793	3529	6317	2261	4549	26254	988
9.04	54104	260333	56577	68505	24580	27899	17077	12497	19947	14363	4421
2.05	51046	201843	96248	39784	34488	18015	13102	9267	21524	21203	1869
1.15	26676	163161	58946	32316	16569	10865	8724	5929	14689	19529	2498
4.41	19974	64037	29113	14220	14023	5214	5641	2816	10266	48694	6460
7.28	1886	4258	1016	1861	6654	503	2129	1921	352	48993	167
2.67	5080	23591	6409	6211	3411	1176	1681	1360	5666	8217	758
7.34	4611	16629	11729	11266	4586	904	2053	2074	5566	2714	1228
(7.75)	11112	16551	5333	8625	5533	1468	2508	1970	4393	19002	671
1.74	20499	128396	46177	22315	14995	6994	6138	4949	6503	11683	1889
6.43	14852	73667	25138	16825	6257	5968	3455	2139	5351	9331	1593
2.27	13686	53888	22934	10670	6575	3518	2330	2589	4142	2154	670
(10.22)	29213	101417	48985	25437	30176	10286	8732	5455	6615	22532	1100
(0.56)	6572	23222	5114	6505	3806	1774	2996	1737	1900	14562	799
5.65	81690	274150	96888	41210	42922	9336	11292	9530	19277	325665	13302
0.90	33719	108544	44074	16922	14944	6831	5499	4129	6557	130885	
(1.61)	23135	67975	22643	13466	18365	8176	6805	4487	11215	13173	1287
1.20	18356	66120	10087	9984	16268	4089	6258	3509	2873	57117	646
2.57	6151	30896	11702	8007	3608	3124	1475	904	4241	925	563
3.33	18764	80845	32873	17691	13445	6793	4881	3026	10834	37218	7770
3.66%	$2351575	$8519903	$3117824	$1596420	$1407037	$518287	$482450	$337508	$796877	$1334955	81918

Vehicle Mileage (000)	Vehicle Mileage (000)				Average Haul (In Miles)	Line Haul Cost/ Mile	Tons Carried		Shipments Carried		Average Load (In Tons)
	Owned Vehicles	Leased Vehicles w/Driver	Leased Vehicles w/o Driver	Intermodal			LTL (000)	TL (000)	LTL (000)	TL (000)	
33332	31352			1981	800	$0.84	691	207	1605	21	8.1
212516	209852	6		2658	1185	1.01	1980	718	4146	79	15.0
13044	13044				248	1.51	572	146	1674	13	13.6
22006	5265	305	16436		255	1.24	531	302	1045	27	9.6
155422	109883	21167	7530	16842	563	1.11	2017	1169	4695	100	11.5
21992	19783	2209				N.A.	431	84	424	19	8.2
43834	13141	4693	6038			N.A.	482	93	952	46	N.A.
160878	133379	1891		25608		—	95	57	4487	62	11.8
60791	54406			6385		—	53	14	6171	85	8.9
96724		3500	84000	9224		N.A.	5400	961	4284	139	8.0
43468	35714	4996		2758	800	1.05	603	221	1145	24	11.3
18444	17979	372	94		609	N.A.	429	121	1124	13	9.2
557344	508941	11877	1010	35516	1391	N.A.	4944	1587	12163	173	16.1
20479	20479				193	0.98	565	342	1195	30	8.5
11645	5671	5075	899		284	N.A.	145	62	892	9	9.9
25457	14609	1131	7717	3000	800	N.A.	1161	1	846	18	10.2
27680	22431	2	3249		1241	N.A.	24	49	4851	82	7.0
16185	16185				702	N.A.	149	113	1694	15	9.4
25303		2000				N.A.	421	1	2115	29	12.8
16878	16878					N.A.	71	28	1751	19	9.5
58808		1490	56027	1291	1249	1.07	506	312	1084	29	17.3
44669	29113	15270	286		368	0.95	529	459	1002	60	8.1
240535	235184			5350	629	0.82	2838	1584	6307	144	11.5
161622	144330			17292	1286	1.23	1492	417	3492	50	14.9
89909	75914	3412		10582	591	1.16	1662	837	3546	90	10.4
506248	461438	700		44110	1100	1.28	4400	1468	11638	165	15.5
66021	64614	1407			N.A.	N.A.	1600		N.A.	N.A.	N.A.
19909	19909				512	N.A.	410	464	899	26	9.7
40460	40460				1100	N.A.	1100	454	1727	40	7.1
23735	8365	15370				N.A.	410	251	692	25	10.6
58737	58737				301	1.02	1349	540	3241	49	9.7
53880	53880				238	0.92	1173	420	2043	47	7.1
16302	16181	121			200	1.36	575	95	1528	12	8.2
97211	94124	1580		1508	1403	N.A.	790	310	2016	46	15.9
25273	12216	8874	15	4168	359	0.83	364	435	835	32	9.9
1616001	1592408	23593		N.A.	N.A.	N.A.	31960		242863	—	N.A.
62459	62459				542	1.05	704	563	2068	53	11.2
84174	31843	52331			2436	N.A.	475	171	912	20	11.9
17900	17614	274	12		444	N.A.	368	196	709	19	14.0
640097	609411	12		30674	1115	1.00	6800	1468	14955	190	14.7
5507374	4818751	241946	246073	200608	565	$1.04	60680	21240	2530230	2100	11.01

Other Trucking Segments

(all dollar amounts in thousands)

Fleet Name, City, State	Gross Revenues	Total Operating Expenses	Net Operating Income	Operating Ratio	Interest Expense	Other Income Adjustments	Income/ Deferred Taxes	Net Income	Net Profit Margin, %
TRUCKLOAD GENERAL FREIGHT									
BUILDERS TRANSPORT, CAMDEN, SC	$ 203861	$ 195780	$ 8081	96.0	$ 8764	$ (4)	$ (196)	$ (491)	(0.24)%
COUNTRY WIDE TRUCK SERVICE, POMONA, CA	87834	87423	411	99.5	2559	431	(201)	(1516)	(1.73)
CRETE CARRIERS CORP., LINCOLN, NE	95939	91261	4678	95.1	90	1711	(286)	6585	6.86
DART TRANSIT CO., ST. PAUL, MN	85141	79614	5527	93.5	1902	1476	53	5048	5.93
GEMINI TRPTN. SERVICES, GREENSBURG, PA	89044	86609	2435	97.3	90	(1070)	887	388	0.44
J.B. HUNT TRANSPORT INC., LOWELL, AR	392553	332808	59745	84.8	6500	—	20200	33045	8.42
JONES MOTOR COMPANY, SPRING CITY, PA	68554	67465	1090	98.4	1	568		1657	2.42
M.S. CARRIERS, INC., MEMPHIS, TN	68480	57801	10679	84.4	773	545	4012	6439	9.40
MERCER TRANSPORTATION CO., LOUISVILLE, KY	73388	68919	4469	93.9	20	—	39	4410	6.01
MISSOURI-NEBRASKA EXP., ST. JOSEPH, MO	85230	81281	3949	95.4	2375	1135	1241	1469	1.72
MUNSON TRANSPORTATION, MONMOUTH, IL	82933	75564	7369	91.1	3763	127	371	3362	4.05
P.A.M. TRPTN. SERVICES, TONTITOWN, AR	75796	73746	2049	97.3	3440	111	34	(1314)	(1.73)
PENNSYLVANIA TRUCK LINES, WYNNEWOOD, PA	88920	86887	2033	97.7	421	1502	2201	913	1.03
PRE-FAB TRANSIT, FARMER CITY, IL	72181	70000	2181	97.0	258	466	622	1767	2.45
RANGER TRANSPORTATION, JACKSONVILLE, FL	209926	207074	2852	98.6		129	1549	1432	0.68
ROADRUNNER TRUCKING, ALBUQUERQUE, NM	74270	67621	6649	91.0	746	(1178)	1805	2920	3.93
RYDER DISTRIBUTION RESOURCES, MIAMI, FL	251755	246707	5048	98.0		(2053)	3951	(956)	(0.38)
RYDER FREIGHT SYSTEM, SALT LAKE CITY, UT	84894	89487	(4593)	105.4	180	(41924)	(6155)	(40542)	(47.76)
SCHNEIDER NATIONAL CARRIERS, GREEN BAY, WI	302919	295853	7066	97.7	1533	1497	2020	5010	1.65
SIGNAL DELIVERY SERVICE, DOWNERS GROVE, IL	248725	238164	10561	95.8	4733	(7)	4585	1236	0.50
UNIVERSAL AM-CAN, LTD., STERLING HTS., MI	78614	73299	5315	93.2	32	852	1957	4178	5.31
WERNER ENTERPRISES, OMAHA, NE	191438	163232	28206	85.3	2091	448	10492	16071	8.39
TOTAL—TRUCKLOAD GENERAL FREIGHT	$ [illegible]	$ [illegible]	$ [illegible]	[illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	1.70%
TANK TRUCK									
CHEMICAL LEAMAN TANK LINES, EXTON, PA	$ 214424	$ 208280	$ 6145	97.1	$ 5305	$ (1305)	$ 1757	$ (2222)	(1.04)%
DSI TRANSPORTERS, INC., DEER PARK, TX	69627	63651	5976	91.4	1450	30	1825	2731	3.92
FLEET TRANSPORT CO., INC., CLEVELAND, OH	72683	73767	(1084)	101.5	2158	527	—	(2715)	(3.74)
GROENDYKE TRANSPORT INC., ENID, OK	76357	71733	4624	93.9	1164	132	38	3554	4.65
KOCH SERVICE, INC., WICHITA, KS	91956	74140	17816	80.6	16	—	6699	11101	12.07
MATLACK, INC., WILMINGTON, DE	227695	220842	6852	97.0	5741	176	433	854	0.38
MILLER TRANSPORTERS, INC., JACKSON, MS	74048	71731	2316	96.9	1047	(47)	546	676	0.91
REFINERS TRPT. & TERMINAL, CLEVELAND, OH	69039	71371	(2332)	103.4	1774	115	—	(3991)	(5.78)
TOTAL—TANK TRUCK	$ [illegible]	$ [illegible]	$ [illegible]	[illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	1.11%
MOTOR VEHICLES									
ALLIED SYSTEMS "LTD.," DECATUR, GA	$ 200822	$ 194688	$ 6135	96.9	$ 1012	$ 779	$ —	$ 5902	2.94%
ANCHOR MOTOR FREIGHT, BIRMINGHAM, MI	272209	263367	8842	96.7	5652	310	4166	(666)	(0.24)
CASSENS TRANSPORT CO., EDWARDSVILLE, IL	81129	77724	3405	95.8	609	327	1033	2090	2.58
COMMERCIAL CARRIERS INC., SOUTHFIELD, MI	198043	183727	14316	92.8		1064	4212	11168	5.64
COMPLETE AUTO TRANSIT, BLOOMFIELD HILLS, MI	247180	232059	15121	93.9	1731	3541	2470	14461	5.85
CONVOY COMPANY, PORTLAND, OR	68636	68178	458	99.3	57	278	299	380	0.55
JACK COOPER TRPT. CO., OKLAHOMA CITY, OK	90788	88562	2226	97.6	1649	(330)	242	5	0.01
DALLAS & MAVIS FORWARDING, KENOSHA, WI	85350	80004	5346	93.7	62	122	2157	3249	3.81
E&L TRANSPORT COMPANY, DEARBORN, MI	104757	101537	3219	96.9	74	555	1300	2400	2.29
M&G CONVOY, INC., BUFFALO, NY	107455	105601	1854	98.3	1197	345	(1036)	2038	1.90
NU-CAR CARRIERS, INC., BIRMINGHAM, MI	145847	148146	(2299)	101.6	4113	6	(800)	(5606)	(3.84)
TOTAL—MOTOR VEHICLE CARRIERS	$ [illegible]	$ [illegible]	$ [illegible]	[illegible]	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	2.21%
REFRIGERATED COMMODITIES									
FFE TRPTN SVCS INC, DALLAS, TX	$ 88699	$ 84286	$ 4414	95.0	$ 445	$ 262	$ 1354	$ 2877	3.24%
KLLM TRANSPORT SERVICE, INC., JACKSON, MS	97410	89019	8391	91.4	3749	26	1725	2943	3.02
MIDWEST COAST TRANSPORT, SIOUX FALLS, SD	69174	67474	1701	97.5	77	116	546	1194	1.73
NATIONAL CARRIERS, INC., LIBERAL, KS	68118	66006	2111	96.9	2024	493	245	335	0.49
TOTAL—REFRIGERATED COMMODITIES	$ [illegible]	$ [illegible]	$ [illegible]	[illegible]	$ [illegible]	$ [illegible]	$ 3870	$ 7349	2.27%
OTHER SPECIALIZED									
ANDERSON TRUCKING SVC, ST CLOUD, MN	$ 83822	$ 78970	$ 4852	94.2	$ 705	$ (176)	$ 1288	$ 2683	3.20%
JACK GRAY TRANSPORT, INC., GARY, IN	76447	68983	7464	90.2	469	552	3086	4461	5.84
INDEPENDENT FREIGHTWAYS, ROCKFORD, IL	130802	129141	1661	98.7	246	—	815	600	0.46
MERCHANTS HOME DELIVERY, OXNARD, CA	78137	71809	6328	91.9	23	(130)	2905	3270	4.18
STOOPS EXPRESS, INC., ANDERSON, IN	104533	102995	1538	98.5	862	—	—	676	0.65
TRI-STATE MOTOR TRANSIT, JOPLIN, MO	93721	94179	(459)	100.5	1471	2444	174	340	0.36
TOTAL—OTHER SPECIALIZED	$ 567462	$ 546077	$ 21384	96.3	$ 3776	$ 2690	$ 8268	$12030	2.12%

Salaries-Officers/Supervisors	Salaries & Wages	Fringes	Maintenance/Operating Supply/Exp.	General Supplies & Expenses	Operating Taxes & Licenses	Insurance	Communication & Utilities	Depreciation & Asset Disposition	Equipment Rents/Purch. Transportation	Tons Carried (000)	Vehicle Mileage (000)
$12050	$ 62710	$ 13303	$ 39248	$ 11784	$ 19864	$ 10866	$ 4479	$ 19618	$ 1863	5966	200233
4953	14183	3298	16748	4619	3045	4912	1507	6585	27574	N/A	N/A
2398	1391	689	2166	1327	168	2065	814	1985	78257	N/A	N/A
1252	3320	886	5968	1809	1341	2107	1053	3203	58675	1426	80217
→	8680	462	1548	4258	39	3859	517	260	66986	N/A	N/A
16810	118595	27344	63916	6778	33770	16892	7804	40895	4	N/A	382743
3493	9028	4939	118	7018	1123	1892	543	109	39202	1263	45448
2465	15777	3445	13620	6730	2195	2791	1148	8172	1458	N/A	60601
2364	1166	844	194	3858	1206	3230	1066	143	54847	1241	65175
3044	26497	4092	23056	52	4081	2839	1292	7452	8877	616	88886
2339	22590	5949	19093	3367	7663	2963	1245	9589	764	1985	79964
→	29437	←	22885	1719	3411	3103	1397	9185	2609	N/A	82913
10345	32017	17417	12031	4025	1550	1933	700	2565	4306	N/A	13761
1833	8387	2154	8954	5196	2397	3361	1386	895	35438	1062	76527
591	13954	872	4849	22898	1997	7167	1169	1817	151760	N/A	N/A
→	17858	←	16275	1657	2606	2760	1045	4942	20478	N/A	N/A
11481	88969	27488	28430	19711	1055	9500	2464	2024	55585	2507	104237
3730	23208	6100	27276	3324	3114	4672	2030	555	15478	1072	96718
→	68651	←	57383	63747	15689	13454	W GS&E	508	76421	N/A	N/A
8601	99034	40338	25659	21852	11530	8526	1203	15680	5742	N/A	160544
3650	2565	758	544	6808	1502	2366	1234	2746	51125	1680	33927
→	68194	←	39675	1220	19834	8707	2667	20022	2913	N/A	192151
$91399	$736711	$160375	$4	$	$	$	$	$	$	N/A	N/A
$13355	$ 42459	$ 20123	$ 35339	$ 10683	$ 6682	$ 7437	$ 4317	$ 12299	$ 55586	6413	101594
4395	20888	5438	11540	6229	3622	2748	1240	5569	1981	3579	45555
2447	3491	2364	5404	10912	821	4014	1039	2383	40893	7507	52778
2897	21639	5262	9069	2971	3190	6447	786	2899	16572	4389	54735
3804	26306	5161	18412	6793	1925	4089	1337	5932	381	N/A	51082
12875	50561	19467	38674	12506	9168	6284	4924	14828	51554	8760	113711
4816	18248	6605	10874	4091	3326	2365	1357	3062	16988	3253	47716
1832	19416	9625	9085	10301	1115	3643	750	3088	12518	6214	36038
$46421	$208608	$ 74625	$	$	$	$	$	$	$	N/A	503209
$ 4571	$ 75495	$ 26597	$ 25476	$ 14572	$ 10321	$ 9989	$ 1452	$ 1385	$ 24830	7277	90957
8810	97820	40064	38657	31760	4077	16725	1818	22613	1026	3284	106010
2216	29851	10367	11068	2460	4969	3156	562	2795	10280	1060	42432
6944	65244	22961	25880	5688	9377	7676	1218	10627	28113	3455	86238
7465	72265	28991	32028	8079	10678	7614	1961	19606	43372	2698	112280
2419	24419	9549	9101	3426	3539	2363	713	2402	10247	810	28302
4893	35091	14674	16850	3058	4945	3802	775	4458	16	1256	44253
1736	21888	9839	8018	13588	3095	2792	955	778	17314	1196	53096
5069	31824	12468	14313	6092	5231	4061	897	2549	19033	1238	38681
4386	35969	13898	15134	3988	4648	5526	908	9607	11538	1381	41750
5481	52660	20059	23696	14384	2903	11022	972	8143	8826	3202	58140
$53990	$542526	$207431	$	$	$	$	$	$	$	27907	702139
$ 5371	$ 2251	$ 2407	$ 4526	$ 4326	$ 915	$ 2705	$ 1758	$ 1467	$ 58561	967	46469
4043	24832	3938	33600	4860	1684	5349	—	10713	—	1457	92195
2486	675	985	1346	1385	111	2222	638	2202	55425	806	72577
1838	1586	1161	2463	2568	491	2621	358	1341	51579	N/A	N/A
$13738	$ 29344	$ 9491	$	$	$	$	$	$	$165565	N/A	N/A
$ 947	$ 11644	$ 2600	$ 10565	$ 4333	$ 2515	$ 2424	$ 1477	$ 3922	$ 38543	896	68456
2794	3622	1828	2998	3121	961	3024	577	1076	48983	4548	47543
1397	4617	561	708	13693	492	5843	1571	1470	98789	N/A	N/A
5765	3299	1572	283	7943	97	(205)	650	884	51522	N/A	N/A
1358	15756	4175	—	21705	2114	3402	1344	3145	49996	1298	100870
5880	12477	4152	9162	4800	4630	3631	2146	2572	44730	804	75560
$18141	$ 51415	$ 14888	$	$	$	$	$	$	$332563	N/A	N/A

(all dollar amounts in thousands)

Fleet Name, City, State	Gross Revenues	Total Operating Expenses	Net Operating Income	Operating Ratio	Interest Expense	Other Income Adjustments	Income/ Deferred Taxes	Net Income	Net Profit Margin, %
HOUSEHOLD GOODS									
ALLIED VAN LINES, INC., NAPERVILLE, IL	$ 383626	$ 377150	$ 6476	98.3	$ [illegible]	$ [illegible]	$ [illegible]	$ [illegible]	[illegible]
ATLAS VAN LINES, INC., EVANSVILLE, IN	201007	189076	11931	94.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BEKINS VAN LINES CO., HILLSIDE, IL	212650	210286	2364	98.9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
BURNHAM SERVICE CO., INC., COLUMBUS, GA	96144	87520	8624	91.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MAYFLOWER TRANSIT, INC., INDIANAPOLIS, IN	314226	305343	8884	97.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NORTH AMERICAN VAN LINES, INC., FT. WAYNE, IN	817895	795636	22259	97.3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UNITED VAN LINES, INC., FENTON, MO	440284	440199	85	100.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
TOTAL HOUSEHOLD GOODS	$ [illegible]	$ [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Definitions and Explanations Of Financial Terminology Used On The Charts

Operating Ratio: Operating expenses as a percentage of gross revenues. Since it excludes extraordinary expenses, income taxes and interest, individual peculiarities are eliminated so the ratio may be used as an industry-wide measure of performance.

Other Fringes: Includes charges such as federal and state payroll taxes, group and workers' compensation insurance, pension and retirement plans through both commercial insurance and unions.

Maintenance/Operating Supplies and Expenses: Includes fuel, oil, lubricants and coolants, vehicle parts, vehicle maintenance by outside vendors, tires and tubes, and miscellaneous supplies such as hand tools, brake fluid and antifreeze.

General Supplies and Expenses: Includes costs of administrative supplies including computer software, books, magazines, magnetic tapes, postage, stationery, printing of tariffs, advertising, commission agent fees, solicitation commissions, company personnel's T&E expenses. Also building and equipment rents and miscellaneous expenses such as fees for professional services by physicians, attorneys, etc., plus uncollectable revenues.

Operating Taxes and Licenses: Includes fuel and oil taxes, vehicle license and registration fees based on usage, real estate and personal property taxes, and tax items such as capital stock taxes, gross receipts taxes, occupancy taxes, etc.

Depreciation and Amortization & Gain or Loss on Disposition or Operating Assets: Includes depreciation of structures on owned land, revenue and shop equipment, furniture and office equipment, amortization of improvements to leasehold property, fixed term motor carrier franchises, permits, licenses, patent rights, etc., gain or loss on disposition of operating assets such as sold, traded or retired tractors, trailers and trucks.

Revenue Equipment Rents and Purchased Transportation: Includes amounts payable for furnishing vehicles with or without the services of drivers, transportation of shipments in another carrier's vehicle including intermodal fleets, and allowance to shippers for picking up or delivering freight to a carrier's facility.

THE Top 100

were $29,041,440, a 6.9% increase over 1987. With revenues increasing at a faster pace than expenses, the top for-hire fleets had an aggregate 94.8 operating ratio last year. In 1987, the Top 100 had an average OR of 96.5.

Although those numbers represent improvement over 1987, the Top 100 didn't enjoy a boom year in 1988. Their profit performance last year—based on a comparison of operating ratios—was a little short of the margins realized in the 1984-86 period when the average ORs were 94.5, 94.3 and 94.0, respectively.

Total expenses increased 6.9% over 1987.

Four fleets capture increasing share of revenue

Year	UPS	Yellow	CF	Roadway	4 Fleets Combined
1968	8.4%	2.4%	4.9%	3.8%	19.5%
1969	9.8%	2.6%	4.9%	3.8%	21.1%
1970	12.3%	3.0%	4.9%	4.3%	24.5%
1971	12.3%	3.0%	4.5%	4.4%	24.1%
1972	13.3%	3.2%	4.3%	4.7%	25.5%
1973	13.2%	3.4%	4.3%	4.9%	25.8%
1974	13.2%	3.6%	4.3%	5.1%	26.2%
1975	16.4%	3.7%	4.2%	5.1%	29.3%
1976	14.9%	3.9%	4.5%	5.3%	28.6%
1977	16.8%	4.1%	4.4%	5.5%	30.9%
1978	16.7%	4.1%	4.6%	5.5%	30.9%
1979	17.5%	4.3%	4.5%	5.8%	32.0%
1980	19.8%	3.6%	4.7%	5.8%	33.9%
1981	21.3%	4.1%	4.6%	5.2%	35.3%
1982	23.8%	4.4%	5.0%	5.6%	38.8%
1983	25.3%	4.8%	5.1%	5.7%	41.0%
1984	25.2%	5.5%	5.2%	5.7%	41.5%
1985	27.1%	5.6%	5.3%	5.7%	43.7%
1986	27.4%	6.0%	5.5%	5.6%	44.5%
1987	28.6%	6.2%	5.5%	5.7%	46.0%
1988	29.9%	6.5%	5.7%	5.5%	47.7%

Biggest get even bigger

And, as has been the case since CCJ started providing data on the Top 100 in 1969, four less-than-truckload carriers have dominated the for-hire industry, based on revenues. As reflected in the chart, Yellow Freight System, United Parcel Service (UPS), Consolidated Freightways and Roadway Express continue to gradually increase their share of the nation's freight, to the point that they may soon control one-half of the traffic handled by the Top 100 fleets.

Last year, based on the consolidation of financial data for its two corporate entities, UPS led the pack once again with $9.1 billion, a 13.5% hike in gross revenues compared to 1987. The package delivery fleet headquartered in Greenwich, Conn., rang up $428.7 million in operating income in 1988, 30% better than the previous year. And UPS' 95.3 OR was slightly better than the 95.9 garnered in 1987.

Yellow Freight improved the most, compared to the other three leading LTL carriers, with gross sales increasing 14.4% to $1.9 billion and a 50.4% jump in operating profits which hit $110.1 million. As a result, the Overland Park, Kan.-based carrier's OR dropped from 95.8 in 1987 to 94.5 last year.

Consolidated Freightways ranked third in the Top 100 with $1.75 billion in gross sales last year, a 12.5% increase over 1987. The Portland, Ore.-based fleet tallied $105.8 million in operating income in 1988, a 37.9% improvement over the previous year's profit level. Thus, the OR declined from 95.1 in 1987 to 93.9 last year.

Text continues on page 82

TOP 100

(all dollar amounts in thousands)

1988 Revenue Rank	Fleet Name, City, State	Carrier Type	1988 Gross Revenues	1987 Gross Revenues	1987 Revenue Rank	Operating Ratio			
						1988	Rank	1987	Rank
1	UNITED PARCEL SERVICE (OHIO), GREENWICH, CT	CMGF	$6608037	$5828293	1	93.6	33	94.3	T34
2	UNITED PARCEL SERVICE (NEW YORK), GREENWICH, CT	CMGF	2526709	2220415	2	99.9	87	100.0	75
3	YELLOW FREIGHT SYSTEM, INC., OVERLAND PARK, KS	CMGF	1991602	1740696	3	94.5	42	95.8	45
4	CONSOLIDATED FREIGHTWAYS CORP (DEL), PORTLAND, OR	CMGF	1749180	1555217	5	93.9	T35	95.1	39
5	ROADWAY EXPRESS, INC., AKRON, OH	CMGF	1693597	1596304	4	94.1	T39	94.6	37
11	ANR FREIGHT SYSTEM, INC., DENVER, CO	CMGF	468009	405920	12	101.5	T92	103.1	86
12	UNITED VAN LINES, INC., FENTON, MO	CMHG	440284	419414	11	100.0	88	100.9	77
13	J.B. HUNT TRANSPORT, INC., LOWELL, AR	CMGF	392553	296419	18	84.8	5	85.0	4
14	ALLIED VAN LINES, INC., NAPERSVILLE, IL	CMHG	383626	382738	13	98.3	T75	99.1	67
15	PRESTON TRUCKING COMPANY, INC., PRESTON, MD	CMGF	368044	318852	16	97.1	T63	100.1	76
21	TRANSCON LINES, LOS ANGELES, CA	CMGF	266061	333755	15	108.6	99	103.3	T87
22	RYDER DISTRIBUTION RESOURCES, INC., MIAMI, FL	CTGS	251755	206462	NR	98.0	74	98.1	NR
23	SIGNAL DELIVERY SERVICE, INC., DOWNERS GROVE, IL	CMSC	248725	232276	22	95.8	T50	97.5	55
24	COMPLETE AUTO TRANSIT, INC., BLOOMFIELD HILLS, MI	CTMV	247180	234727	24	93.9	T35	93.0	T24
25	MATLACK, INC., WILMINGTON, DE	CTLP	227694	204301	26	97.0	T61	98.6	62
31	BUILDERS TRANSPORT, INC., CAMDEN, SC	CMGF	203861	185258	32	96.0	53	92.7	T21
32	ATLAS VAN LINES, INC., EVANSVILLE, IN	CMHG	201007	184754	33	94.1	T39	94.2	T30
33	ALLIED SYSTEMS, LTD.,[2] DECATUR, GA[2]	CMMV	200822	N.A.		96.6	55	N.A.	—
34	COMMERCIAL CARRIERS, INC., BLOOMFIELD HILLS, MI	CMMV	198043	189539	29	92.8	T27	92.2	20
35	WERNER ENTERPRISES, INC., OMAHA, NE[3]	CMGF	191438	139088	40	85.3	6	84.6	3
41	INDEPENDENT FREIGHTWAYS, INC., ROCKFORD, IL[3]	CMSC	130802	129391	NR	98.7	T80	98.2	NR
42	A-P-A TRANSPORT CORP., NORTH BERGEN, NJ	CMGF	129151	118918	47	93.5	T31	92.9	23
43	TNT RED STAR EXPRESS, INC., AUBURN, NY	CMGF	127420	114306	49	96.1	54	95.5	T41
44	SOUTHEASTERN FREIGHT LINES, COLUMBIA, SC	CMGF	119983	101860	54	92.3	26	94.4	36
45	AAA COOPER TRANSPORTATION, DOTHAN, AL	CMGF	116472	92113	60	87.9	11	90.4	T14

For Top 100 listings under "Type": BM-building materials; CM-common; CT-contracts; GF-general freight; ED-explosives/dangerous articles; FP-forest products; HG-household goods; HM-heavy machinery; LP-liquid petroleum products (included, in most cases, other bulk commodities); MV-motor vehicles; RS-retail store delivery; SC-specific commodity not otherwise grouped.
T: Tie in Operating Ratio. NR: Not Ranked

(all dollar amounts in thousands)

1988 Revenue Rank	Fleet Name, City, State	Carrier Type	1988 Gross Revenues	1987 Gross Revenues	1987 Revenue Rank	Operating Ratio			
						1988	Rank	1987	Rank
51	CONTRACT FREIGHTERS, INC., JOPLIN, MO[4]	CMSC	99207	82039	64	85.5	7	88.4	10
52	KLLM TRANSPORT SERVICES, INC., JACKSON, MS	CMRC	97410	75229	70	91.4	T22	90.4	T14
53	BURNHAM SERVICE COMPANY, INC., COLUMBUS, GA	CMHG	96144	93878	58	91.0	T17	88.5	11
54	CRETE CARRIER CORPORATION, LINCOLN, NE	CMGF	95939	89008	61	95.1	44	94.3	T34
55	ADVANCE TRANSPORTATION COMPANY, MILWAUKEE, WI	CMGF	94977	76072	68	97.1	T63	97.4	54
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61	CON-WAY WESTERN EXPRESS, PORTLAND, OR	CMGF	88799	65992	87	86.9	8	87.9	8
62	FFE TRANSPORTATION SERVICES, INC., DALLAS, TX	CMRC	88699	83261	63	95.0	43	96.4	49
63	MERCHANTS FAST MOTOR LINES, INC., ABILENE, TX	CMGF	88593	76389	67	99.4	84	102.4	82
64	ESTES EXPRESS LINES, RICHMOND, VA	CMGF	88446	79518	66	84.4	T3	85.5	5
65	COUNTRY WIDE TRUCK SERVICE, INC., POMONA, CA	CMGF	87834	72664	75	99.5	T85	93.0	T24
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
71	HYMAN FREIGHTWAYS, INC., ST. PAUL, MN	CMGF	84864	73533	74	99.5	T85	98.7	T63
72	ANDERSON TRUCKING SERVICE, INC., ST. CLOUD, MN	CMSC	83822	74720	71	94.2	41	96.5	50
73	MUNSON TRANSPORTATION, INC., MONMOUTH, IL	CMGF	82933	66091	86	91.1	19	90.3	13
74	CASSENS TRANSPORT COMPANY, EDWARDSVILLE, IL	CMMV	81129	67218	84	95.8	T50	99.9	T72
75	UNIVERSAL AM-CAN, LTD., STERLING HEIGHTS, MI	CMGF	78614	65506	89	93.2	30	94.2	T30
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
81	WILLIG FREIGHT LINES, SAN FRANCISCO, CA	CMGF	75572	68629	80	92.9	29	93.2	26
82	G.I. TRUCKING COMPANY, LA MIRADA, CA	CMGF	75001	61962	100	103.5	97	98.7	T63
83	ROADRUNNER TRUCKING, INC., ALBUQUERQUE, NM	CMGF	74270	60110	NR	91.0	T17	91.9	RN
84	MILLER TRANSPORTERS, INC., JACKSON, MS	CMLP	74048	66936	85	96.9	T58	95.2	40
85	SAIA MOTOR FREIGHT LINE, INC., HOUMA, LA	CMGF	73441	62586	95	87.2	10	86.9	T6
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
91	JONES TRANSFER COMPANY, MONROE, MI	CMGF	71996	71372	76	103.3	95	101.5	78
92	DSI TRANSPORTS, INC., DEER PARK, TX	CMLP	69627	55245	NR	91.4	T22	91.4	NR
93	MIDWEST COAST TRANSPORT, INC., SIOUX FALLS, SD	CMRC	69174	70747	78	97.5	70	96.2	T47
94	REFINERS TRANSPORT & TERMINAL CORP., CLEVELAND, OH	CMLP	69039	65686	88	103.4	96	105.2	92
95	TRANSUS, INC., ATLANTA, GA	CMGF	68787	75734	69	99.1	82	107.9	96
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
100	NATIONAL CARRIERS, INC., LIBERAL, KS	MS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

	Gross Revenue	Expenses	Post Tax Net Income
TOTAL TOP 100—1988	$30,540,353	$29,041,440	$937,809
TOTAL TOP 100—1987	$28,155,417	$27,157,323	$480,580
TOTAL TOP 100—1986	$26,898,993	$25,083,023	$943,215

TOP 100

(all dollar amounts in thousands)

1988 Revenue Rank	Fleet Name, City, State	Carrier Type	1988 Gross Revenues	1987 Gross Revenues	Operating Ratio	
					1988	1987
101	MARTEN TRANSPORT, LTD., MONDOVI, WI	CMRC	67173	57557	94.2	90.2
102	GRAEBEL VAN LINES, INC., WAUSAU, WI	CMHG	66870	62118	99.5	98.2
103	CARRETTA TRUCKING, INC., PARAMUS, NJ	CMGF	65658	57275	97.3	93.5
104	PAULS TRUCKING CORPORATION, AVENEL, NJ	CTSC	65337	65326	97.5	96.1
105	ACE TRANSPORTATION, INC., LAFAYETTE, LA	CMSC	64532	43790	95.3	94.4
[illegible]						
111	C.R. ENGLAND & SONS, SALT LAKE CITY, UT	CMGF	59286	40483	90.2	92.3
112	WILSON TRUCKING CORP., FISHERVILLE, VA	CMGF	58807	55456	89.8	88.0
113	FREYMILLER TRUCKING, INC., BAKERSFIELD, CA	CMGF	58736	42103	93.9	90.2
114	GLOBAL VAN LINES, INC., ORANGE, CA	CMHG	58605	61044	98.4	98.3
115	McGIL SPECIALIZED CARRIERS, MARIETTA, GA	CMSC	57970	51285	98.2	97.4
[illegible]						
121	FORE WAY EXPRESS, INC., WAUSAU, WI	CMGF	55776	44096	98.1	96.8
122	MONFORT TRANSPORTATION CO., GREELEY, CO	CMGF	55749	38764	92.8	91.6
123	JONES TRUCK LINES, INC., SPRINGDALE, AR[1]	CMGF	54910	188299	97.3	94.1
124	SOUTHWESTERN MOTOR TRPT, SAN ANTONIO, TX	CMGF	54723	47810	95.1	97.6
125	ALTERMAN TRANSPORT LINES, OPA LOCKA, FL	CMRC	54508	53950	99.7	97.2
[illegible]						
131	CONWAY EASTERN EXPRESS, INC., PORTLAND, OR	CMGF	51794	42649	110.4	115.8
132	HADLEY AUTO TRANSPORT, SANTA ANA, CA	CTMV	50001	46751	91.5	91.9
133	COLONIAL FREIGHT SYSTEMS, KNOXVILLE, TN	CMRC	49794	42242	96.3	96.4
134	McKENSIE TANK LINES, INC., TALLAHASSEE, FL	CMLP	49349	45858	94.1	94.9
135	CROUSE CARTAGE COMPANY, CARROLL, IA	CMGF	48965	44496	96.4	100.5
[illegible]						
141	PIONEER TRANSPORTATION SYSTEMS, HURLOCK, MD	CMGF	47874	N.A.	96.3	N.A.
142	WHEATON VAN LINES, INC., INDIANAPOLIS, IN	CMHG	47651	44591	94.4	94.3
143	THE O.K. TRUCKING COMPANY, CINCINNATI, OH	CMGF	47075	47411	97.6	108.0
144	CONTRACT TRANSPORTATION SYS., CLEVELAND, OH	CTGF	46748	53282	94.6	90.7
145	SHAFFER TRUCKING, INC., NEW KINGSTOWN, PA	CMRC	46286	46913	92.7	91.0
[illegible]						

Carriers among the top 100 in 1987 who are no longer in operation are: *American Freight System, Pilot Freight Carriers, CW Transport,* and *Overland Express.*

Carriers with revenues sufficient to rank them among the top 100, but for whom data was not received in time, include: *Bowman Transportation, Inc.* (Atlanta, GA); *Brown Transport Corp.* (Elberton, GA) [Brown had acquired *Thurston Motor Lines, Inc.* of Charlotte, NC, another top 100 carrier]; *National Freight* (Vineland, NJ); and *Whiteford Truck Lines* (South Bend, IN).

[1]*Ranger Transportation, Independent Freightways,* and *Gemini* are part of the *Landstar* Group of carriers. Others in the group for which data could not be obtained for 1988 are *Poole Truck Lines* (Evergreen, AL) and *Ligon Nationwide* (Madisonville, KY).

[2]*Allied Systems "Ltd"* is a consolidated group consisting of *Auto Convoy Company* and *Motor Convoy, Inc.* formed in August 1988. The Motor Convoy had previously ranked 46 among the CCJ Top 100; Auto Convoy Company had ranked number 92.

(all dollar amounts in thousands)

1988 Revenue Rank	Fleet Name, City, State	Carrier Type	1988 Gross Revenues	1987 Gross Revenues	Operating Ratio 1988	Operating Ratio 1987
151	KENAN TRANSPORT COMPANY, CHAPEL HILL, NC	CMLP	44822	39753	90.1	86.8
152	ROEHL TRANSPORT, INC., MARSHFIELD, WI	CMGF	44707	36598	86.1	86.5
153	GORDON TRUCKING, INC., SUMNER, WA	CMGF	44272	N.A.	95.0	N.A.
154	DI SALVO TRUCKING CO., SAN FRANCISCO, CA	CMGF	42779	41346	101.7	97.4
155	ARMELLINI EXPRESS LINES, PALM CITY, FL	CMSC	42024	42085	98.5	97.2
156	BULLDOG TRUCKING, INC., CARNEGIE, OK	CMGF	41800	41488	90.7	84.2
157	MIDDLE WEST FREIGHTWAYS, INC., ST. LOUIS, MO	CMGF	41716	39840	97.6	99.2
158	STANDARD TRUCKING COMPANY, CHARLOTTE, NC	CMGF	41744	38847	96.2	104.9
159	FREDRICKSON MOTOR EXPRESS, CHARLOTTE, NC	CMGF	41484	42795	100.2	98.4
160	LENERTZ, INC., SOUTH ST. PAUL, MN	CMGF	41178	44063	98.0	97.2
161	GLENN McCLENDON TRUCKING CO., LAFAYETTE, AL	CMGF	41009	36776	96.6	98.6
162	WARD TRUCKING CORP., ALTOONA, PA	CMGF	40992	37911	99.9	104.9
163	TLC LINES, INC., FENTON, MO	CMGF	40800	33606	96.3	96.3
164	SAM TANKSLEY TRUCKING, CAPE GIRARDEAU, MO	CMGF	40775	39297	103.4	102.7
165	GEORGE TRANSFER, INC., PARKTON, MD	CMGF	40200	36315	96.6	96.3
166	SCHANNO TRANSPORTATION, WEST CHICAGO, IL	CMSC	40178	39644	95.9	95.0
167	NORTH PENN TRANSFER, INC., SPRINGDALE, PA	CMGF	39874	41091	98.9	105.4
168	LYNDEN TRANSPORT, INC., KENT, WA	CMGF	39826	38720	99.6	97.6
169	MOTOR CARGO, INC., SALT LAKE CITY, UT	CMGF	39638	40864	87.9	88.8
170	THE McKEE COMPANY, DES MOINES, IA	CMSC	39614	44240	98.1	97.5
171	LEASEWAY DELIVERIES, INC., DOWNERS GROVE, IL	CMSC	39184	N.A.	99.7	N.A.
172	NTC OF AMERICA, INC., TULSA, OK	CMSC	39017	42233	99.6	97.7
173	BULKMATIC TRANSPORT COMPANY, CHICAGO, IL	CMSC	39002	33687	93.2	94.9
174	PACIFIC MOTOR TRANSPORT, SAN FRANCISCO, CA	CMGF	38811	36039	94.1	93.8
175	PBX, INC., DAKOTA CITY, NE	CTRC	38704	37611	86.4	91.0
176	PUGH TRUCK LINES, INC., KNOXVILLE, TN	CMLP	38586	36436	84.7	85.0
177	THE MANFRED MOTOR TRANSPORT, NEWBURY, OH	CMSC	38548	45479	93.3	93.7
178	G. HAERMAN TRUCKING, MILWAUKEE, WI	CMSC	38484	34084	96.9	95.1
179	THE MASON & DIXON LINES, INC., KINGSPORT, TN	CMGF	38410	35430	96.9	96.9
180	QUALITY CARRIERS, INC., VERMONT, PRAIRIE, WI	CMLP	37965	37111	96.4	96.2
181	ACME TRUCK LINE, INC., HARVEY, LA	CMGF	37497	30651	95.8	95.2
182	INDUSTRIAL FREIGHT SYSTEM, SUN VALLEY, CA	CMGF	37290	24692	99.7	97.6
183	SOUTHWEST MOTOR FREIGHT, CHATTANOOGA, TN	CMGF	37203	N.A.	103.0	N.A.
184	GREAT COASTAL EXPRESS, RICHMOND, VA	CMGF	36812	35326	85.6	87.8
185	GROSS COMMON CARRIERS, WISCONSIN RAPIDS, WI	CMGF	36160	29536	99.7	101.5
186	FLEET CARRIER CORPORATION, TUNTAS, MI	CMGF	36044	36857	90.8	90.5
187	UMTHUN TRUCKING COMPANY, EAGLE GROVE, IA	CMGF	35710	33466	94.9	95.9
188	ASSOCIATED PETROL CARRIERS, SPARTANBURG, SC	CMLP	35696	32818	100.3	101.5
189	DIETZ-URRAGE TRUCKING CO., THEALKA LAKE, MS	CMGF	35610	N.A.	95.8	N.A.
190	A.J. METTLER HAULING & RIGGING, KNOXVILLE, TN	CMSC	35144	32454	98.3	98.9
191	SMITHWAY MOTOR XPRESS, INC., FORT DODGE, IA	CMGF	34809	34736	95.0	97.6
192	HEARTLAND EXPRESS INC., CORALVILLE, IA	CMGF	34571	26018	94.7	98.5
193	BLUE RIDGE TRANSFER CO., INC., ROANOKE, VA	CMGF	34527	35593	98.7	98.6
194	ENTERPRISE TRANSPORTATION CO., HOUSTON, TX	CMLP	34340	31494	93.8	94.3
195	PAUL ARPIN VAN LINES, EAST GREENWICH, RI	CMHG	34253	31323	96.6	95.6
196	U.S. TRUCK COMPANY, INC., DETROIT, MI	CMGF	34241	26571	96.3	100.6
197	HOLMES FREIGHT LINES, INC., OMAHA, NE	CMGF	33953	27326	91.8	99.1
198	REDWING CARRIERS, INC., TAMPA, FL	CMGF	33431	31320	95.0	98.0
199	J.H. WARE TRUCKING, INC., FULTON, MO	CMGF	32900	25333	97.5	98.2
200	TOLLIE FREIGHTWAYS, INC., KANSAS CITY, KS	CMGF	32827	29634	93.8	94.7

[3]*Werner's* figures are for the fiscal year ended February 28, 1989.

[4]*Contract Freighters'* data is based on quarterly reports, which do not provide sufficient information to include them in the detailed tables on subsequent pages.

[5]*Jones Truck Line* data reflects the period of operations from October 5, 1988 through Jan 2, 1989 only, due to the acquisition of the company from *Sun Carriers* on October 4.

NR—Not ranked among top 100 in previous year.

N.A.—Not available.

THE TOP 100

Roadway Express's gross revenues reached $1.69 billion last year, a 6.1% increase over 1987. Operating income for 1988 was $100.6 million, 16.3% higher than the previous year. Headquartered in Akron, Oh., Roadway's OR declined from 94.6 in 1987 to 94.1 last year.

Yellow had the most improvement (+10.4%) in tons per load in 1988, compared to the previous year. CF hauled 4.6% more tonnage last year. Roadway averaged 6.5 tons per load in both 1988 and 1987.

Koch Services had lowest OR

Koch Service, the Wichita, Kan. tank truck carrier, had the lowest OR – 80.6 – in '88.

Koch just edged the 81.6 OR earned by New Penn Motor Express. The Lebanon, Pa.-based regional LTL carrier had the lowest OR the two previous years.

New Penn, however, had the highest net profit margin, 14.69%, while Koch Services' net profit level was 12.07%.

Other fleets that had ORs under 85 last year are: Estes Express, Richmond, Va., and M.S. Carriers, Memphis, Tenn., both garnering 84.4s, and J.B. Hunt, Lowell, Ark., 84.8.

None of the auto carriers, reefer fleets or household goods carriers reporting had an OR under the 90 mark.

> None of the auto carriers, reefer fleets or household goods carriers had an OR under the 90 mark.

A beleaguered Transcon Lines, Los Angeles, had the highest operating loss (-$22.8 million) and suffered with a 108.6 OR. Although its $6.0 million operating loss wasn't as devastating, Spartan Express, Greer, S.C., had the highest OR – 108.8.

But several fleets' revenues increased significantly in 1988. AAA Cooper reported a $24.4 million sales boost, pushing the Dothan, Ala. regional LTL carrier from the 60th spot on the Top 100 rankings for 1987 to the 45th position for 1988. And Con-Way Western Express, Portland, Ore., moved from number 87 to the 61st place among the Top 100 ratings with $88.8 million in gross revenues last year.

Specialized carriers

Once again, Matlack ($227.7 million), Wilmington, Del., edged Chemical Leaman ($214.4 million), Exton, Pa., for revenue honors among the bulk carriers.

Among the car carriers, Complete Auto Transit, Bloomfield Hills, Mich., had the highest operating income – $15.1 million – and Commercial Carriers, Southfield, Mich., had the lowest OR – 92.8.

KLLM Transport Service, Jackson, Miss., led the refrigerated carriers across the board, with $97.4 million in sales and $8.4 million in operating profits, plus a 91.4 OR.

Although North American Van Lines, Fort Wayne, Ind., had the highest revenue ($81.8 million) and operating profit ($22.3 million), the 91.0 OR by Burnham Service, Columbus, Ga., registered the lowest OR – 91.0.

Top 200

Ploff Trucking, Jacksonville, Fla., had an 84.7 OR, the lowest operating ratio among the fleets that ranked between 101 and 200 of the nation's leading for-hire fleets.

Great Coastal Express, Richmond, Va., had the group's next best OR – 85.6.

Among the 101-200 group's best sales performer's in 1988 were:

- Ace Transportation, Lafayette, La., a $19.7 million increase to $64.5 million.
- C.R. England and Sons, Salt Lake City, Ut., with a $18.8 million revenue hike to $59.3 million. □

Where the Top 100 data comes from

Top 100 data is based on information filed with the Interstate Commerce Commission by Class I and II for-hire carriers. The statistics are compiled exclusively for CCJ by the American Trucking Associations.

Since carriers' reporting and deadline requirements have been changed by the ICC, some detailed information on carriers' equipment and maintenance activities is only available for less-than-truckload fleets. With the exception of household goods carriers which weren't required to provide the information, significant financial data has been added to the Top 100 charts.

And fleets designated as contract carriers aren't included since they aren't required to file quarterly reports with the ICC.

Top 100 and Trends and Statistics are available in a booklet for $5. For a single copy of the booklet, write on company letterhead to: Reprint Editor, Commercial Carrier Journal, Chilton Way, Radnor, Pa. 19089. Send prepaid check or money order.

INDUSTRY TRENDS AND STATISTICS

A strong 1988 economy generated few complaints about business opportunities. Carrier earnings were up as were factory sales of new vehicles and equipment.

By JERRY STANDLEY, *Editor-In-Chief*, and MARGARET ROMAN-SLAVIN, *Market Research Editor*

STATISTICAL ANALYSIS OF THE TRUCK INDUSTRY—PRIVATE AND FOR-HIRE CARRIAGE*

FLEET SIZE	TOTAL FLEETS	TOTAL VEHICLES *	# OF STRAIGHT TRUCKS OPERATED	# OF TRACTORS OPERATED	# OF TRAILERS OPERATED	# OF BUSES OPERATED	# OF OFF-HIGHWAY VEHICLES OPERATED
500 & over	3,311	4,938,115	1,652,366	843,597	1,805,389	223,268	413,495
100 – 499	12,834	2,377,474	746,194	434,722	825,991	149,048	221,519
50 – 99	13,658	895,347	292,127	162,791	278,335	63,275	98,819
25 – 49	20,943	697,611	264,726	114,360	184,051	54,045	80,429
10 – 24	29,153	456,766	210,857	68,782	101,066	27,351	48,710
TOTAL	**79,899**	**9,365,313**	**3,166,270**	**1,624,252**	**3,194,832**	**516,987**	**862,972**
VOCATION OR BUSINESS							
Common/ Contract	17,595	2,727,478	262,337	789,376	1,596,470	28,121	51,174
Lease/Rental	3,198	1,105,436	412,468	276,414	365,751	20,348	30,455
Food Industry	9,445	753,731	270,547	138,993	292,847	6,009	45,335
Local, State & Federal Government	7,421	1,422,374	875,598	54,339	176,263	53,584	262,590
Construction/ Mining	12,867	736,651	283,291	64,178	216,808	2,969	169,405
Manufacturing/ Processing	6,436	549,278	204,598	75,858	210,739	7,411	50,672
Petroleum	3,055	150,778	69,411	25,445	40,917	907	14,098
Public Utility	3,661	570,909	418,655	12,060	74,092	3,998	62,104
Retail/ Wholesale Delivery	7,480	505,323	196,161	97,913	154,450	11,248	45,551
Sanitation & Refuse	987	56,797	37,764	5,909	8,961	69	4,094
Schools	4,352	289,717	54,242	4,416	7,183	212,208	11,668
Buses	1,337	178,642	8,301	1,389	3,533	163,484	1,935
Other	2,065	318,199	72,897	77,962	46,818	6,631	113,891
TOTAL	**79,899**	**9,365,313**	**3,166,270**	**1,624,252**	**3,194,832**	**516,987**	**862,972**

* Does not include passenger cars. *Source: CCJ Census of the Professional Truck Fleet Market, June 1989*

This chart segments the motor carrier industry by fleet size and vocation or business. Substantial procedural difficulty in obtaining accurate vehicle counts within four categories – large (500+) private and for-hire carriers with numerous vehicle operating locations, lease/rental fleets, government fleets and trailers – make it virtually impossible to eliminate a small amount of duplication remaining in the number of vehicles reported to be operated in *those market segments only!* All others vehicle counts are accurate as of June, 1989. CCJ estimates absolute maximum duplication in those four categories to be no higher than 10%. Those requiring a more detailed explanation for any of the above should contact CCJ's Marketing Dept., at 215-964-4521.

TRENDS & STATISTICS

NUMBER OF FOR-HIRE CARRIERS

Year	Class I (Over $5 Million)	Class II ($1-$5 Million)	Class III (Under $1 Million)	TOTAL*
1988	889	1,179	37,182	39,609
1987	856	1,266	35,505	38,338
1986	947	1,387	33,903	36,948
1985	1,013	1,489	30,337	33,283
1984	1,088	1,554	27,370	30,481
1983	1,139	1,631	24,411	27,517
1982	1,144	2,139	22,059	25,722
1981	1,031	2,293	18,563	22,270

Left: This chart logs the continuing consolidation of larger Class 1 and 2 carriers (Class 1 = revenues greater than $5 million; Class 2 = between $1 million and $5 million), as well as the growth in Class 3 (revenues less than $1 million). The number of Class 1 carriers has dropped 22% since the high of 1982, but the real squeeze is among Class 2 carriers, which have diminished 48.6% (by 1,114 carriers) since 1981. The Class 3 ranks have risen 154% (22,572) since 1980 levels of 14,610 carriers. However, the number for Class 3 can be misleading because they include all ICC authorized carriers, including private fleets with for-hire operating authority.

* The carrier totals for 1988 reflect 359 Class 1 and 2 carriers operating, but exempted from filing with the Interstate Commerce Commission. The number of exempted Class 1 and 2 carriers in previous years totaled: 711 in both 1987 and 1986; 444 in 1985; 469 in 1984; 336 in 1983; 380 in 1982; 383 in 1981.
Source: American Trucking Associations, Inc.

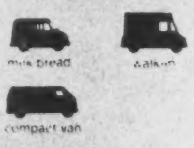
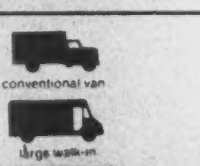
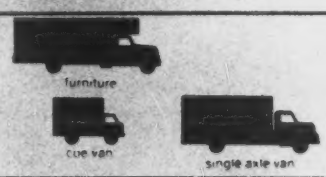
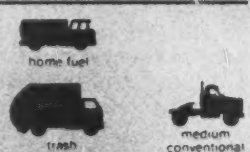
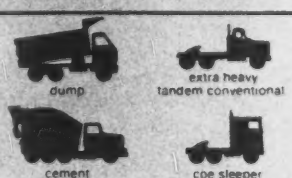
SELECTED FINANCIAL DATA FROM CLASS 1 AND CLASS 2 COMMON CARRIERS

	All General Freight & Specialized Carriers 1988 (000)	1987 (000)	Percent of Change (88-87)	Percent of Revenue (1988)
Number of Carriers	117	117		
GROSS OPERATING REVENUES	$12,619,184	$11,317,290	11.50%	100.00%
Salaries-Officers and Supervisors	$1,172,880	$1,072,911	9.32%	9.29%
Salaries & Wages & Paid Time Off	$4,698,681	$4,226,108	11.18%	37.23%
Other Fringes	$1,706,146	$1,473,469	15.79%	13.52%
Salaries, Wages & Fringe Benefits	$7,577,707	$6,772,488	11.89%	60.05%
Operating Supplies & Expenses	$1,068,126	$989,042	8.00%	8.46%
General Supplies & Expenses	$533,264	$490,074	8.81%	4.23%
Operating Taxes & Licenses	$408,062	$385,613	5.82%	3.23%
Insurance	$322,880	$290,281	11.23%	2.56%
Communication & Utilities	$199,898	$187,893	6.39%	1.58%
Depreciation & Amortization	$537,840	$503,225	6.88%	4.26%
Equipment Rental & Purch. Trptn.	$1,035,610	$979,762	5.70%	8.21%
Building & Office Equipment Rental	$144,695	$114,913	25.92%	1.15%
Other & Miscellaneous Expenses	$111,353	$95,165	17.01%	0.88%
TOTAL OPERATING EXPENSES	$11,939,435	$10,808,456	10.46%	94.61%
NET CARRIER OPERATING INCOME	$679,749	$508,834	33.59%	5.39%
NET INCOME BEFORE TAXES	$591,005	$429,488	37.61%	4.68%
NET INCOME AFTER TAXES	$385,520	$262,273	46.99%	3.06%
OPERATING RATIO	94.61	95.50		
NET PROFIT MARGIN	3.06	2.32		
Vehicle Miles Traveled	3,977,558	3,729,777	6.64%	
Tons Handled	84,156	77,842	8.11%	

This chart compares totals and percentage changes in selected 1988 and 1987 financial items for 117 Class 1 & 2 Less-than-truckload common carriers. Changes in Interstate Commerce Commission (ICC) financial reporting requirements resulted in the exclusion of truckload carriers that were included in previous years' charts. Data is compiled by American Trucking Associations, Inc., Alexandria, Va., based on carrier financial reports (Form QFR) to the ICC by Class 1 and 2 "Instruction 27" carriers (75% or greater revenues derived from general commodity freight). Statistics from United Parcel Service, contract carriers and household goods movers are excluded from this chart. To provide accurate two-year comparisons, figures from 1987 are restated on the basis of those same carriers filing 1988 reports with the ICC.

15-YEAR FACTORY SALES OF TRUCKS BY GVW (1974 through 1988)

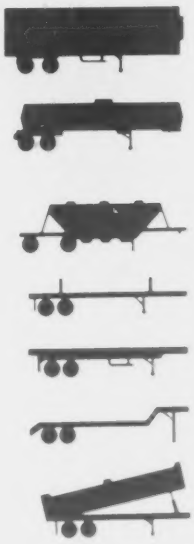
(Includes U.S. total domestic and export sales. Excludes tactical military vehicles and buses.)

	CLASS 1 **6,000 lb & Less**	No. of Units **20,829,840**	% of Total **51.20%**
	CLASS 2 **6,001-10,000 lb**	No. of Units **15,625,769**	% of Total **38.41%**
	**CLASS 3** **10,001-14,000 lb**	No. of Units **214,956**	% of Total **0.53%**
	**CLASS 4** **14,001-16,000 lb**	No. of Units **14,063**	% of Total **0.03%**
	CLASS 5 **16,001-19,500 lb**	No. of Units **79,213**	% of Total **0.19%**
	**CLASS 6** **19,501-26,000 lb**	No. of Units **1,324,891**	% of Total **3.26%**
	**CLASS 7** **26,001-33,000 lb**	No. of Units **826,661**	% of Total **2.03%**
	**CLASS 8** **33,001 lb & Over**	No. of Units **1,764,815**	% of Total **4.34%**
	TOTAL	**40,680,208**	**100.00%**

R.L. Polk estimates the total number of Class 1 - 8 trucks in use is 50,220,000. The R.L. Polk total includes imported vehicles, school buses and private fleet buses, but does not include municipal buses. The CCJ total listed above does not include buses or imports, and does not reflect a scrappage rate, which R.L. Polk estimates at 4.8% annually.

Source: Motor Vehicle Manufacturers Association, CCJ Marketing Dept.

BREAKDOWN OF NEW TRAILER SHIPMENTS (1974 through 1988)



	Number	% of Total
VANS		
Dry Freight/Closed Top	1,120,811	47.1
Dry Freight/Open Top	80,425	3.4
Insulated/Semi-Insulated	290,339	12.2
Drop Frame	72,279	3.0
Livestock	22,072	0.9
Total Vans	1,585,926	66.6
SPECIAL TYPES		
Tanks/Liquid	94,559	4.0
Dry Bulk	25,559	1.1
Pole and Logging	22,816	1.0
Platform	333,859	14.0
Low-Bed	103,198	4.3
Dump	109,516	4.6
All Others	104,383	4.4
Total Special Types	793,890	33.4
TOTAL COMPLETE TRAILERS	2,379,816	100.0
Detachable Trailers[1]	96,437	
Detachable Chassis[2]	237,475	
Dollies and Converter Gear[3]	54,729	

1. Mostly container units. 2. Mostly for use with containers. 3. Separate axle and fifth wheel assembly used to convert semi-trailer into full trailer for twin trailer operations.
Source: Industry Div., Bureau of the Census, Dept. of Commerce. Compiled by CCJ Marketing Dept.

NEW TRAILER SHIPMENTS BY TYPE

Type of Trailer	1988	1987	1986	1985	1984
VANS					
Dry Freight/Closed Top	91,201	99,054	95,236	84,950	115,399
Dry Freight/Open Top	3,133	2,776	3,149	3,685	4,087
Insulated/Semi Insulated	24,884	26,650	22,654	21,934	27,768
Drop Frame	5,970	5,237	3,637	8,229	7,112
Livestock	2,203	1,663	1,996	1,421	2,234
Total Vans	127,391	135,380	126,672	120,219	156,600
SPECIAL TYPES					
Tanks/Liquid	5,230	4,827	4,792	5,670	4,818
Dry Bulk	1,020	1,030	1,233	1,477	1,556
Pole and Logging	796	1,060	1,163	1,977	3,371
Platform	17,566	15,219	14,011	18,839	25,685
Low-Bed	8,119	10,594	10,945	11,414	8,281
Dump	8,883	7,990	8,371	8,903	8,895
All Others	6,990	19,412	4,538	7,807	4,550
Total Special Types	48,604	60,132	45,053	56,087	57,156
TOTAL COMPLETE TRAILERS	175,995	195,512	171,725	176,306	213,756
Detachable Trailers[1]	4,931	563	595	286	983
Detachable Chassis[2]	32,174	7,560	6,334	15,591	44,877
Dollies/Converter Gear[3]	2,298	4,371	3,755	4,522	6,759

1. Mostly container units. 2. Mostly for use with containers. 3. Separate axle and fifth wheel assembly for converting semi-trailer into full trailer in twin trailer doubles operations.
Source: Industry Div., Bureau of the Census, Dept. of Commerce. Compiled by CCJ Marketing Dept.

Overall truck trailer sales dropped 19,517 units (10%) last year, returning to moderate 1985 levels. Of the two main categories, Special Types accounted for the lion's share, falling 19% (11,528 units). This decrease was led by Low-Bed sales, which were down 23% (2,475 units). Pole and logging type sales dropped 25% (264 units). If the current surge of activity in the mining industry continues, sales of dump and other related trailer types may get a boost this year.

The Van trailer segment faired slightly better, yet still decreased 6% (7,989 units). Dry freight closed top and insulated semi-insulated vans declined 8% and 7% respectively. Optimism rises as better times in the agricultural market helped spark a 13% increase in dry freight open top and a 32% increase in livestock trailers.

DIESEL ENGINES USED IN TRUCKS

(Factory sales from U.S. plants including exports)

Make of Truck		Cat	Cummins	Detroit Diesel	International	Mack	All** Other	Total
Chevrolet	1988	1,428	–	22,595	–	–	–	**24,023**
	1987	1,595	–	35,134	–	–	– 16	36,745
Ford	1988	8,706	9,558	398	54,574	–	32,161	**105,397**
	1987	11,551	8,940	3,632	56,261	–	19,799	100,183
Freightliner	1988	7,444	14,948	1,296	–	–	–	**23,688**
	1987	7,301	15,758	512	–	–	–	23,571
GMC	1988	2,863	1,719	13,306	–	–	13	**17,901**
	1987	4,029	4,232	16,272	–	–	435	24,968
International	1988	1,517	21,969	5	46,520	–	–	**70,011**
	1987	1,396	20,117	327	38,144	–	–	59,984
Jeep Corp.	1988	–	–	–	–	–	3,917	**3,917**
	1987	–	–	–	–	–	9,260	9,260
Kenworth	1988	5,552	9,286	636	–	–	–	**15,474**
	1987	4,549	8,301	85	–	–	–	12,935
Mack	1988	251	203		–	22,112	102	**22,668**
	1987	187	252	40	–	19,713	1	20,193
Mercedes-Benz	1988	–	–	–			3,221	**3,221**
	1987	–	–	–			4,220	4,220
Peterbilt	1988	11,031	6,471	468	–	–	–	**17,970**
	1987	8,784	5,410	25	–	–	–	14,219
Volvo GM	1988	4,967	12,059	2,529	–	–	282	**19,837**
	1987	3,065	7,136	883	–	–	328	11,412
Others*	1988	296	5,020	76	–	–	–	**5,392**
	1987	368	592	143	–	–	–	1,103
Total	1988	44,055	81,233	41,309	123,206	22,112	39,696**	**329,499**
	1987	42,825	70,738	57,053	94,405	19,713	34,059**	318,793

Left: There was good and bad news in 1988 diesel engine sales, which were up 3.36% (10,706 units). International's diesel sales rocketed 30.51% (28,801 units), refelcting a surge in Class 6 sales, and strengthening it industry-leading market share of 37%. The bad news in 1988 was Detroit Diesel, whose engine sales plummeted 27.6% (15,744 units), mainly reflecting loss of business to General Motors, which sold the engine Division. * Others include: Oshkosh and Marmon.

** All Others includes: Isuzu, Mercedes-Benz, Scania-Vabis, Volvo, Ford, Renault (Mack) and GMC Deere. Reporting firms do not represent entire industry.

Source: *Motor Vehicle Manufacturers Association.*

Below: This chart illustrates the six-year performance of Class 1-8 domestic factory sales of trucks. Class 8 truck sales, the industry bellweather, were up 11% (13,704 units). That gain is overshadowed, however, by a dramatic 71.6% jump in Class 6 sales (12,240 units). International trucks, from Navistar, absorbed two-thirds of the Class 6 sales increase in the form of large volume orders for its 97-in. BBC model equipped with the International diesel engine. Class 7 sales continue their see-saw, this time down 6% (5,198 units), after an 8% upswing (6,744 units) in 1987.

DOMESTIC TRUCK FACTORY SALES BY GVW

	1988	1987	1986	1985	1984	1983
Class 1 (6000 lb and less)						
Total Sales	2,496,648	2,270,566	1,964,832	1,854,901	1,610,835	1,296,644
Diesel Sales	86	1,813	4,999	9,663	15,234	25,565
% Diesel	–	0.1%	0.3%	0.5%	0.9%	2.0%
Class 2 (6001-10,000 lb)						
Total Sales	1,020,515	976,803	927,462	989,633	997,626	787,611
Diesel Sales	79,535	85,125	96,443	123,882	122,995	89,161
% Diesel	7.8%	8.7%	10.4%	12.5%	12.3%	11.3%
Class 3-4 (10,001-16,000 lb)						
Total Sales	86	476	–	19,397	5	3
Diesel Sales	86	322	–	5,870	–	–
% Diesel	100%	67.6%	–	30.3%	–	–
Class 5 (16,001-19,500 lb)						
Total Sales	5,224	5,841	5,749	5,123	5,502	1,143
Diesel Sales	1,599	431	–	–	–	–
% Diesel	30.6%	7.4%	–	–	–	–
Class 6 (19,501-26,000 lb)						
Total Sales	29,332	17,092	17,846	25,810	29,273	24,310
Diesel Sales	17,429	9,184	9,265	14,253	13,789	9,703
% Diesel	59.4%	53.7%	51.9%	55.2%	47.1%	39.9%
Class 7 (26,001-33,000 lb)						
Total Sales	79,143	84,341	77,597	81,122	74,445	48,896
Diesel Sales	56,574	56,719	47,694	50,492	43,412	29,468
% Diesel	71.5%	67.2%	61.5%	62.2%	58.3%	60.3%
Class 8 (33,001 lb & Over)						
Total Sales	135,129	121,425	103,216	120,941	138,584	78,575
Diesel Sales	134,981	121,192	102,671	120,311	137,692	78,008
% Diesel	99.9%	99.5%	99.5%	99.4%	99.3%	99.1%

TRUCK FACTORY SALES AND TRUCKS WITH DIESELS

(U.S. domestic only; excluding tactical military vehicles)

GVW Group-ings	Truck Sales With Diesel Engines	Chevrolet	GMC	Chrysler	Ford	Freight liner	Inter national	Jeep Corp.	Kenworth	Mack	Mercedes-Benz	Peterbilt	Volvo GM	Others	Total Trucks
Under	Sales – 1987	747,435	182,861	256,007	813,941	–	–	167,604	–	–	–	–	–	102,718	2,270,566
6,000	w/Diesel – 1987	1,085	339	–	389	–	–	–	–	–	–	–	–	–	1,813
lb	Sales – 1988	860,869	201,005	313,388	826,121	–	–	199,346	–	–	–	–	–	95,919	2,496,648
	w/Diesel – 1988	84	1	–	1	–	–	–	–	–	–	–	–	–	86
6,001	Sales – 1987	323,710	92,778	41,671	502,835	–	–	15,809	–	–	–	–	–	–	976,803
to	w/Diesel – 1987	28,548	5,332	–	51,245	–	–		–	–	–	–	–	–	85,125
10,000	Sales – 1988	340,524	102,454	31,895	532,026	–	–	13,616	–	–	–	–	–	–	1,020,515
lb	w/Diesel – 1988	16,829	4,731	4,577	53,398	–	–	–	–	–	–	–	–	–	79,535
10,001	Sales – 1987	–	–	–	154	–	–	–	–	–	–	–	–	–	154
to	w/Diesel – 1987	–	–	–	–	–		–	–	–	–	–	–	–	–
14,000	Sales – 1988	–	–	–	–	–	–	–	–	–	–	–	–	–	– –
lb	w/Diesel – 1988	–	–	–	–	–	–	–	–	–	–	–	–	–	– –
14,001	Sales – 1987	–	–	–	–	–	322	–	–	–	–	–	–	–	322
to	w/Diesel – 1987	–	–	–	–	–	322	–	–	–	–	–	– –		322
16,000	Sales – 1988	–	–	–	–	–	86	–	–	–	–	–	–	–	86
lb	w/Diesel – 1988	–	–	–	–	–	86	–	–	–	–	–	–	–	86
16,001	Sales – 1987	239	5,602	–	–	–	–	–	–	–	–	–	–	–	5,841
to	w/Diesel – 1987	–	431	–	–	–	–	–	–	–	–	–	–	–	431
19,500	Sales – 1988	203	5,021	–	–	–	–	–	–	–	–	–	–	–	5,224
lb	w/Diesel – 1988	–	1,599	–	–	–	–	–	–	–	–	–	–	–	1,599
19,501	Sales – 1987	1,966	3,361	–	5,165	–	5,121	–	–	–	– 1,479	–	–	–	17,092
to	w/Diesel – 1987	377	992	–	1,215	–	5,121	–	–	–	– 1,479	–	–	–	9,184
26,000	Sales – 1988	2,178	7,560	–	5,367	–	13,157	–	–	–	1,070	–	–	–	29,332
lb	w/Diesel – 1988	422	929	–	1,851	–	13,157	–	–	–	1,070	–	–	–	17,429
26,001	Sales – 1987	8,483	19,132	–	30,854	–	23,703	–	–	–	2,169	–	–	–	84,341
to	w/Diesel – 1987	3,289	7,005	–	20,553	–	23,703	–	–	–	2,169	–	–	–	56,719
33,000	Sales – 1988	8,423	14,788	–	31,181	–	23,075	–	–	–	1,676	–	–	–	79,143
lb	w/Diesel – 1988	3,273	7,167	–	21,383	–	23,075	–	–	–	1,676	–	–	–	56,574
33,001	Sales – 1987	456	6,909	–	13,469	22,947	22,091	–	12,269	18,273	–	13,359	10,573	1,079	121,425
lb	w/Diesel – 1987	372	6,827	–	13,402	22,947	22,091	–	12,269	18,273	–	13,359	10,573	1,079	121,192
and	Sales – 1988	243	647	–	15,523	22,970	25,307	–	14,663	20,213	–	16,933	17,877	753	135,129
over	w/Diesel – 1988	206	599	–	15,460	22,970	25,307	–	14,663	20,213	–	16,933	17,877	753	134,981
Total	Sales – 1987	1,082,289	310,643	297,678	1,366,418	22,947	51,237	183,413	12,269	18,273	3,648	13,359	10,573	103,797	3,476,544
Total	w/Diesel – 1987	33,671	21,596	0	86,804	22,947	51,237	–	12,269	18,273	3,648	13,359	10,573	1,079	275,456
Total	Sales – 1988	1,212,440	313,331	345,283	1,410,218	22,970	61,625	212,962	14,663	20,213	2,746	16,933	17,877	96,672	3,747,933
Total	w/Diesel – 1988	20,814	15,026	4,577	92,093	22,970	61,625	–	14,663	20,213	2,746	16,933	17,877	753	290,290

Data are 1988 factory sales from U.S. plants only and does not include sales of vehicles resulting from joint venture agreements between foreign and domestic suppliers. Also, reporting firms do not represent entire industry. Volvo GM numbers include Autocar. Others include Marmon and Oshkosh. Volvo GM does not report separate factory sales figures for Class 8 Volvo, WhiteGMC and Autocar trucks (combined as 17,877 units above). *Others include: Nissan, Marmon and Oshkosh. *Source: MVMA.*

Continuing strong economic growth fueled an 11.1% rise in 1988 total truck factory sales, with Class 1 and Class 8 vehicles showing notable increases of 15.2% and 11.3%, respectively. Volvo GM totals reflect volume increases resulting from the newly formed company's addition of previous GMC heavy truck models. This moved the newly formed company into the number four market share position from number seven in '87. While Peterbilt claims the largest sales volume increase (26.8%), International regained its number one factory sales leadership in Class 8 with 25,307 units sold in 1988, comfortably nudging out Freightliner, which slipped to the number two slot with 22,970 units. The 236 unit decrease in Class 4 is misleading. For instance, 23,052 Ford Class 4 trucks were assembled in Canada and imported for sale in the U.S. market. Thus Class 4 sales activity is much stronger than that portrayed in this chart of U.S. Domestic factory sales chart.

PRIVATE FLEETS

By an overwhelming margin, private carriage is the dominant player in the U.S. trucking industry, based on the number of fleets in operation. Private carriage has become as complex as it is big. Using data collected by CCJ, these exclusive listings include a breakdown of types of vehicles the private carriers operate.

PRIVATE FLEETS

LEASE/RENTAL	Headquarters	Trucks	Tractors	Trailers	Cars	Off-Highway	Total Vehicles
G.E. Capital Fleet Services	Eden Prairie, Minn.	65,000	4800	5200	345,000	0	420,000
Ryder Truck Rental	Miami, Fla.	63,129	31,178	24,155	2209	120,754	241,425e
Enterprise Leasing Co	St. Louis, Mo.	7000	0	0	90,000	0	97,000
Automotive Rentals, Inc.	Maple Shade, N.J.	23,600	600	800	50,117	NA	75,117
Penske Truck Leasing Co.	Reading, Pa.	24,019	17,584	11,566	907	0	54,076e
NationaLease	Chicago, Ill.	10,850	21,800	17,450	NA	NA	50,100
TIP-Transport International Pool	Bala Cynwyd, Pa.	0	0	38,000	0	0	38,000
Amtralease	Cherry Hill, N.J.	10,000	12,000	8,000	1,000	0	31,000
AJF Leasing	St. Louis, Mo.	0	0	26,500	0	0	26,500
Transamerica Trailer Leasing	Piscataway, N.J.	0	0	20,000	0	0	20,000
Chancellor Fleet Corp	Boston, Mass.	425	4935	8530	0	1472	15,362
Ruan Trans. Mgt. Systems	Des Moines, Ia.	500	6600	6500	1000	0	14,600
Greenbrier Capital Corporation	San Francisco, Calif.	0	45	13,100c	0	0	13,145
Trucklease Corp (g)	Worcester, Mass.	3436	1211	1129	6835	311	12,922
Farm Credit Leasing Services	Minneapolis, Minn.	2838	949	2402	2786	1198	10,173
PLM Transportation Equipment	San Francisco, Calif.	0	275	9236	0	0	9511
PACCAR Leasing Corp.	Bellevue, Wash.	683	3309	637	0	0	4629
Transervice Lease Corp	Lake Success, N.Y.	1287	315	1297	56	293	3248
UPS Truck Leasing	Greenwich, Conn.	1450	1350	200	0	0	3000
Mendon Leasing Corp	Brooklyn, N.Y.	2500	a	0	100	0	2600
DeCarolis Truck Rental	Rochester, N.Y.	475	226	519	25	1274	2519
Edart Truck Rental Corp	Hartford, Conn.	700	650	500	75	2	1927
Action Mobile Office Rental	Carson, Calif.	9	7	1769	6	6	1797
Salem Leasing Corp	Winston-Salem, N.C.	106	690	811	0	0	1607
Gordon Thompson Industries	Jacksonville, Fla.	24	10	0	1050	0	1084
HUB Truck Rental, NY Reg	Farmingdale, N.Y.	906	75	0	22	0	1003
Doerrs Trailer Leasing (f)	Orlando, Fla.	0	3	944	1	2	950
Lease Line, Inc	N. Brunswick, N.J.	38	166	706	16	4	930
Maine Trailer	Bangor, Me.	5	3	741	6	0	755
Hunsaker Truck Lease, Inc	Dallas, Tex.	125	275	260	11	10	681
Clark Truck Leasing	Camden, N.J.	250	230	70	10	0	560

a – included in "Trucks." b – includes 12,000 units acquired with buyout of leasing operations of Leaseway. c – large capacity vans. d – does not include Transamerica Interway or Transamerica Trailco Services. e – includes 83 buses. f – regional fleet figures, not national. g – Trucklease cars controlled by Auto Rental Corp. Both are subsidiaries of Automotive Management, Inc. NA – not available.

PRIVATE FLEETS

GENERAL INDUSTRY	Headquarters	Straight Trucks	Tractors	Trailers	Cars	Off Highway	Total Vehicles	Annual Mileage (millions)	* % Leased
Honeywell, Inc	Minneapolis, Minn.	2629	0	0	4658	0	7287	120.4	100
Union Carbide Indus. Gases	Springfield, N.J.	10	400	500	3500	50	4460	NA	90
Pfizer Inc.	New York, N.Y.	550	3	3	2669	0	3225	76	50
Safety-Kleen Corp.	Elgin, Ill.	165	74	107	350	2400a	3096	53.6	0
Air Products & Chemicals, Inc	Allentown, Pa.	340	500	1360	500	170	2870	48	0
National Linen Service	Atlanta, Ga.	1965	25	30	400	NA	2420	37	0
Floyd S Pike Electrical Contractor	Mount Airy, N.C.	1314	4	511	48	513	2390	NA	0
Environmental Industries	Calabasas, Calif.	1100	35	535	166	416	2252	NA	0
Hoechst Celanese Corp	Somerville, N.J.	76	15	73	1872	3	2039	50	98
Greif Brothers Corp	Delaware, Oh.	43	272	1405	151	0	1871	NA	0
CW Wright Construction	Richmond, Va.	930	95	410	20	350	1805	9-10	0
Montgomery Ward & Co	Chicago, Ill.	1520a	0	0	220	0	1740	32	100
Trinity Industries	Dallas, Tex.	22	250	475	115	700	1562	21.0	10
American Greetings	Cleveland, Oh.	5	25	60	1400	0	1490	26	NA
Texas Industries, Inc	Dallas, Tex.	611	154	248	194	180	1387	NA	4
Caterpillar Tractor Co	Peoria, Ill.	300	60	365	450	0	1175	NA	72
Potlach Corp	San Francisco, Calif.	494d	89	96	124	363	1166	NA	0
Hillenbrand Industries, Inc	Batesville, Ind.	275	215	545	82	7	1124	25.5	0
Terminal Freight Handling Co.	Dallas, Tex.	4	237	821	2	10	1074	27	27
Sully-Miller Contracting Co	Long Beach, Calif.	569	111	226	66	30	1002	NA	9
Northrop Aircraft Div	Hawthorne, Calif.	279a,b	18	66	95	509c	967	6.1	1
Union Camp Corp	Wayne, N.J.	5	150	318	420	N/A	893	NA	65
Grossmans Div	Braintree, Mass.	125	16	80	160	450	831	2.2	40
Growmark, Inc	Bloomington, Ill.	5	123	679	0	0	807	9.5	7
McCrory Stores	York, Pa.	10	193	463	60	0	726	18	85
James Julian, Inc	Wilmington, Del.	130	20	90	20	450	710	2	0
Linder Industrial Machinery Co	Lakeland, Fla.	47	2	3	10	500	562	NA	0
Halliburton Services	Wichita, Ks.	53	128	150	60	141	532	.5	0
Scotty's Inc	Winter Haven, Fla.	315	34	180	0		529	NA	NA
LaRoche Industries Inc.	Atlanta, Ga.	85	55	81	102	5	328	NA	95

* – does not include cars. a – includes vans. b – includes light trucks. c – includes some miscellaneous equipment. d – includes light pick-ups. NA – not available

PRIVATE FLEETS

FOOD	Headquarters	Straight Trucks	Tractors	Trailers	Cars	Off Highway	Total Vehicles	Annual Mileage (millions)	* % Leased
Quality Bakers America	Greenwich, Ct.	17,000	9850	11,000	2850	0	40,700	NA	15
Continental Baking	St. Louis, Mo.	9015	720	756	404	12	10,907	181.7	48
ARA Services	Philadelphia, Pa.	5734	30	30	2376	940	9110	273	41
Fleming Companies	Oklahoma City, Okla.	22	1849	3202	2016	0	7089	104	6.5
Interstate Brands Corp	Kansas City, Mo.	5546	557	738	89	0	6930	133	2
Campbell Taggart, Inc	Dallas, Tex.	4425	617	795	875	0	6712	140	14
Nabisco Brands, USA	East Hanover, N.J.	1550	40	110	4500	0	6200	132	27
Borden Inc., Dairy Div.	Houston, Tex.	2839	847	1460	727	0	5873	132	5
Chemlawn Corp.	Columbus, Oh.	3639	0	0	1305b	0	4944	NA	0
Tyson Foods, Inc	Springdale, Ark.	241	1036	1549	853b	722	4401	63	18
Super Valu Stores	Minneapolis, Minn.	2	989	2399	903	0	4293	89	0
Safeway Stores	Oakland, Calif.	29	951	2579	NA	351	3910	65	0
General Foods Bakery Co	Bay Shore, N.Y.	2562	145	347	509	14	3577	NA	5
McKesson Corp.	San Francisco, Calif.	1500	150	215	1300	0	3165	NA	5
Land O'Lakes, Inc	Minneapolis, Minn.	500	400	700	1004d	500	3104	NA	80
Wakefern Food Corp	Elizabeth, N.J.	0	600	1892	250	0	2742	25	95
Stroehmann Bakeries, Inc	Horsham, Pa.	1478	176	353	189	0	2196	38.3	60
Paul's Trucking Corp.	Woodbridge, N.J.	2	306	1818	12	28	2166	23	18
General Foods Corp	White Plains, N.Y.	0	65	200	1900	0	2165	6e	24
Holly Farms Poultry Ind	Wilkesboro, N.C.	121	448	944	146	277	1936	43.5	0
Giant Food, Inc	Landover, Md.	325	252	1327	19	5	1928	15.4	NA
Vons Grocery Co	El Monte, Calif.	49	472	1137	0	21	1679	31	0
Stop & Shop Companies	Boston, Mass.	0	198	1244	85	0	1527	42.7	NA
Foster Farm Services	Livingston, Ca.	81	280	577	540	0	1478	15	0
Acme Markets	Philadelphia, Pa.	2	275	890	150	0	1317	12	NA
H.E. Butt Grocery Co	Corpus Christi, Tex.	7	176	812	160	20	1175	28	6
Houston Coca-Cola Bottling	Houston, Tex.	508b	188	225	60	160	1141	12	0
The Southland Corp	Dallas, Tex.	6	470	612	0	0	1088	27.8	1
Central Soya Co	Fort Wayne, Ind.	165	78	231	264	172	910	7.7	73
Northrup King Co	Minneapolis, Minn.	450b	1	2	100	350	903	15	15
Drake Bakeries, Inc	Wayne, N.J.	643	17	57	46	0	763	10.5	7
Chas. Freihofer Baking	Albany, N.Y.	459	27	78	58	21	643	10	0
Food Service of America	Kent, Wa.	213	181	236	72	0	630	15	1
United States Sugar	Clewiston, Fla.	494	10	18	79	9	610	NA	NA
Dial Corp.	Phoenix, Ariz.	0	23	84	480	0	587	14.0	100

* – does not include cars. a – 100% of tractors & 20% of trailers. b – includes pick up trucks. c – includes vans. d – includes light trucks. e – trucks only. NA – not available

PRIVATE FLEETS

PUBLIC UTILITIES	Headquarters	Straight Trucks	Tractors	Trailers	Cars	Off Highway	Total Vehicles	Annual Mileage (millions)	* % Leased
GTE Service Corp	Irving, Tex.	25,700c	150	725	8410	NA	34,985	380	8
US West	Thornton, Colo.	12,780c	127	50	2830	4541	20,328	150	0
Pacific Gas & Electric	San Francisco, Calif.	9274	76	3917	2682	306	16,255	130	0
Pacific Bell	San Francisco, Calif.	11,518c	30	NA	2167	NA	13,715	114	0
New York Telephone	New York, N.Y.	7,548	1	1	2194	0	9744	89	17
American Elec. Power System	Columbus, Oh.	4180	40	1230	1780	920	8150	73	97
Southern California Edison	Pomona, Calif.	3923	24	1161	1757	812	7677	NA	100
New England Telephone	Boston, Mass.	5900c	0	0	1500	0	7400	74	60
Duke Power Co	Charlotte, N.C.	2988c	75	1238	1159	1126	6586	75	0
Public Service Elec & Gas	Newark, N.J.	2989	9	583	2008	430	6019	30.3	0
LA Dept Water & Power	Los Angeles, Calif.	3230	55	345	1355	1015	6000	53	10
General Public Utilities	Parsippany, N.J.	2706	26	1109	1225	649	5715	45	70
Consumers Power Co	Jackson, Mich.	3002	70	812	534	587	5005	23.0	99
Southern California Gas Co	Los Angeles, Calif.	4067	10	295	508	75	4955	43	100
Niagara Mohawk Power Corp	Syracuse, N.Y.	2617	26	967	659	510	4779	39	89
Commonwealth Edison	Maywood, Ill.	1998	42	706	1527	216	4489	47	.02
Con Edison of NY	Astoria, N.Y.	2603	26	194	1009	469	4301	NA	0
Northeast Utility Service	Kensington, Conn.	1996a,b	11	778	653	286	3724	30	80
ARKLA, Inc	Shreveport, La.	1748	16	864	387	673	3688	32.4	0
Columbia Gas Distribution	Columbus, Oh.	1924	4	216	753	598	3495	33	100
S New England Telephone	New Haven, Conn.	2306c	7	7	1155	NA	3475	33.6	0
N Indiana Public Service	Hammond, Ind.	1630	25	642	269	742	3308	19	2
Pennsylvania Power & Light	Allentown, Pa.	1232	15	636	873	220	2976	22	100
Public Service Co of CO	Denver, Colo.	1558	17	540	402	358	2875	22	6.26
Florida Power & Light	Miami, Fla.	1292	43	797	312	340	2784	NA	2
Long Island Lighting Co.	Hicksville, N.Y.	1359	13	335	652	315	2674	11	14
Philadelphia Electric	Berwyn, Pa.	1442	22	473	705	23	2665	16	100
Detroit Edison	Detroit, Mich.	1250	55	620	231	502	2658	25	93
Central Telephone Co	Chicago, Ill.	1819	0	60	675	20	2574	25.9	0
New York State Elec. & Gas	Binghamton, N.Y.	1388	13	335	492	281	2509	21.7	75.6
Northern States Power Co	Minneapolis, Minn.	950	7	700	750	16	2423	19	30
Illinois Power	Decatur, Ill.	1059	5	488	409	398	2359	13	0
San Diego Gas & Electric	San Diego, Calif.	1300	60	218	539	110	2327	24.6	100
Salt River Project	Phoenix, Ariz.	1140	20	366	296	342	2164	15	0
Northern Illinois Gas	Naperville, Ill.	1021	3	230	556	290	2100	23	0
South Carolina Electric-Gas	Columbia, S.C.	1048	15	320	491	164	2038	NA	0
Jersey Central Power & Light	Morristown, N.J.	1059a,b	9	600	287	50	2005	18	75
Wisconsin Electric Power	Milwaukee, Wisc.	900	13	535	123	343	1914	10.5	0
Cincinnati Gas & Electric	Cincinnati, Oh.	917	2	330	493	155	1897	16.3	0
Oklahoma Gas & Electric	Oklahoma City, Okla.	940	25	322	222d	325	1834d	16	0
Appalachian Power Co.	Roanoke, Va.	1120	7	250	425	25	1827	23.2	100e
Public Service Indiana	Plainfield, In.	900	10	450	300	50	1710	14	85
Memphis Light, Gas & Water	Memphis, Tenn	912	11	220	167	15	1325	2.5	0

* – does not include cars; a – includes vans; b – includes pick-up trucks; c – includes vans and light trucks; d – does not include contract cars; e – all financial leased NA – not available.

PRIVATE FLEETS

STATE GOVERNMENT#	Headquarters	Straight Trucks	Tractors	Trailers	Cars	Off Highway	Total Vehicles	*Annual Mileage (millions)
Texas Hwy & Public Trans	Austin	7391	127	113	1289	9236	18,156	215
California DOT	Sacramento	4733	75	295	3069	4186	12,358	NA
Virginia DOT	Richmond	5100	25	75	2983	1500	9683	NA
Pennsylvania DOT	Harrisburg	4736a	63	276e	597	3996	9668	NA
Massachusetts Motor Vehicle Management Bureau	Boston	3350	14	45	3273	2750	9432	NA
South Carolina Hwy/Public Trans	Columbia	3017	60	446	2709	2063	8295	55
New York DOT	Albany	3821a	72	1197	722	1807	7619	41
Florida DOT	Tallahassee	2679	58	394	1614	2802	7547	75
Michigan Management/Budget Dept, Motor Trans Div	Lansing	1471	16	6	5134	11	6638	NA
NJ DOT	Trenton	1487b	6	6	667	4350	6516	31
Illinois DOT	Springfield	3300b	15	300	860	1634	6109	62
Missouri DOT/Hwy Dept	Jefferson City	2607a	16	16	630	2834	6103	NA
Kentucky Trans Cabinet	Frankfort	3761c	26	34	1800	141	5762	65d
Georgia DOT	Atlanta	2847	60	319	466	2000	5692	NA
Arkansas Hwy. Trans. Dept.	Little Rock	1715	69	50	274	3167	5275	38
Indiana Hwy Dept	Indianapolis	1999c	520	115	1226b	1050	4910	40
Alaska DOT	Juneau	2626c	23	116	657	1021	4443	NA
Minnesota DOT	St. Paul	2540c	36	145	376	490	3587	NA
Colorado Dept. Highways	Denver	1946b	36	213	311	929	3435	29
Iowa DOT	Ames	2106	12	12	529	750	3409	22
Oregon DOT/Hwy Div	Salem	952	32	277	1236c	816	3313	NA
Kansas DOT	Topeka	1485c	17	71	234	1147	2954	NA
North Dakota Hwy. Dept.	Bismarck	330	16	16	525	2000	2887	23
Maryland Hwy Admin	Baltimore	1350c	15	16	300	1000	2681	NA
New Mexico Hwy. Dept.	Santa Fe	1423c	59	559e	327	122	2490	24
Arizona DOT	Phoenix	1386	17	211	229	384	2227	20
West Virginia Hwy Dept	Charleston	758	19	154	422	708	2061	NA
South Dakota DOT	Pierre	1050b	9	79	129	535	1802	NA
Connecticut DOT	Wethersfield	1200	12	80	0	420	1712	20
Nebraska Dept. Roads	Lincoln	663	42	44	238	0	1705b	9.3
Maine DOT/Motor Trans Ser	Augusta	750	12	200	421	250	1633	NA
Wisconsin Dept of Admin	Madison	5	0	0	1500	0	1505	25
Montana Hwy Dept	Helena	517	67	140	137	76	1394b	17
New Jersey Turnpike Auth.	Hightstown	385b	3	81	387	450	1306	NA
Alabama Dept. Pub. Safety	Montgomery	20	5	0	1200	0	1225	NA
Idaho DOT	Boise	998a	17	79	105	0	1199	17
Washington Dept. Nat. Resources	Olympia	616	7	160	251	128	1162	9.2
Delaware DOT	Dover	540a	11	12	229	175	967	NA
New Hampshire DOT	Concord	507b	2	8	218	131	866	10
Louisiana DOT	Monroe, La.	219	9	8	21	330	587	NA
Hawaii DOT	Honolulu	112	8	11	290	157	578	3

* – does not include cars. # – may not include all departments. a – includes pickup trucks. b – includes pick-ups and vans. c – includes pick-up trucks, vans and miscellaneous vehicles; d – includes cars. e – includes all trailers, not just semi s. NA – not available

PRIVATE FLEETS

CITY GOVERNMENT#	Trucks	Tractors	Trailers	Cars	Off Highway	Total Vehicles	Annual Mileage (millions)	* % Leased
Los Angeles, Calif.	4235g	40	375	1200	250	6100	3	0
Atlanta, Ga.	969	48	134	786b	2791	5518	NA	NA
Baltimore, Md.	2700fn	15	25	2000b	400	5140	NA	0
Phoenix, Ariz.	2021e,g,h,i	178	305	1572b,c	445a	4521	40.5	0
Fort Worth, Tex.	1111	4	145	1005	1379	3644	18.6	0
Cleveland, Oh.	1326	6	166	1065	790	3347	15.6	0
Dallas, Tex. Equip Services Dept	880	28	140	1644	430	3122c	48.4	.003
Austin, Tex.	1162	71	197	1074	612	3116	12.5	0
San Antonio, Tx.	1230	152	114	962	303	2761	33	0
Baton Rouge, La.	432	20	53	602	1480	2587	NA	0
Virginia Beach, Va.	806	10	90	641	913	2460	22	0
Miami, Fla.	650	2	50	1100	250	2052	NA	1
Sacramento, Calif.	348	5	165	937	256	1711	13	0
Salt Lake City, Ut.	626o	6	33	646	387p	1698	NA	0
San Jose, Calif.	626c	31	66	644b	306a	1673b	13.4	0
San Diego, Calif.	1206	41	64	94	214	1619j,l	14.5	0
Long Beach, Calif.	601	5	79	666	252	1603	NA	0
Charlotte, N.C.	392	4	4	952	131	1483	15.5	0
Lexington, Ky.	453	59	44	541	372	1469	9	0
Norfolk, Va.	587	2	26	460	387	1462	9.2	0
Clearwater, Fla.	341	11	67	200	498	1417a	4	0
Akron, Oh.	800c	4	15	435b	150	1404	NA	0
Anaheim, Calif.	348	1	90	378	572	1389	5	2
Louisville, Ky.	360g,i	75	25	732	188	1380	9.2	0
Tallahassee, Fla.	648	8	114	297	253	1320	14	0
Greensboro, N.C.	472g,i	2	120	395	196	1185	10.5	0
Raleigh, N.C.	510	1	85	362	170	1128	10.6	.1
Winston-Salem, N.C.	376	3	28	555	147	1109	7.7	0
Orlando, Fla.	472	67r	140s	395	28	1102	NA	0
Corpus Christi, Tex.	265	118	69	339	137	928	NA	0
Knoxville, Tenn.	342e,i,g	6	29	389b	145	911	14	0
Rochester, N.Y.	356	1	18	420b	93	888	7	0
Shreveport, La.	305	12	62	335	123	837	NA	0
Savannah, Ga.	386	1	5	357	55	804	12.4	0
Pontiac, Mich.	175	1	28	102j,l	488a	794,c,d	NA	.007
Roanoke, Va.	329	6	30	215	201	781	NA	1
El Paso, Tex.	532	14	34	83	109	772j,k,i,t	NA	0
Montgomery, Ala.	340e,g,h	2	2	346b	73	763a,c	NA	0
Ft. Lauderdale, Fla.	189	21	39	324b	44	617c,e	NA	0
Midland, Tx.	97	2	4	226	86	415	3.3	0

* – does not include cars. # – may not include all departments. a – includes miscellaneous vehicles. b – includes police fleet. c – includes pickups, vans, jeeps, motorcycles, etc.; d – does not include education or fire dept. e – includes fire trucks. f – includes 340 light trucks. g – includes vans. h – includes dump trucks. i – includes pick-up trucks. j – does not include fire dept; k – does not include school bus fleet. l – does not include police dept. n – includes 300 school buses. o – includes fire, refuse, sweepers, vans. p – includes motorcycles/ATV's; r – includes 60 farm tractors; s – includes 130 misc. small trailers. t – does not include metro, airport and water depts.; NA – not available.

PRIVATE FLEETS

PETROLEUM	Headquarters	Straight Trucks	Tractors	Trailers	Cars	Off Highway	Total Vehicles	Annual Mileage (millions)	* % Leased
Conoco Inc	Houston, Tex.	1400b	435	820	345	NA0	3000	NA	27
Dowell Schlumberger	Tulsa, Okla.	780	725	1044	2000	NA	4549	5.0	NA
Petrolane, Inc	Long Beach, Calif.	1564d	140	273	248	NA	3302	NA	39
Arco Oil & Gas	Dallas, Tex.	848	0	500	646	762	2756	24.9	0
Agway Petroleum Corporation	Syracuse, N.Y.	320	26	28	0	0	1225	12	0
Texaco Refining & Mkt, Inc	Houston, Tex.	69	146	186	742	NA	1143	35.5	98
Weltech, Inc	Houston, Tex.	475	46	50	25	470	1066	20.2	37
Total Petroleum Inc.	Denver, Co.	377a	207	231	201	170	1186	30	97
Liquid Carbonic Corporation	Chicago, Ill.	154	250	630	200	0	1234	27	30
Mobil Oil Corp (c)	Fairfax, Va.	50	310	410	0	160	930	22.0	5
Big Three Industries, Inc	Houston, Tex.	159	91	201	37		488	NA	1.5
Transco Energy Co	Houston, Tex.	450b	5	100	230	50	835	11.5	0
Meenan Oil Co	Wantagh, N.Y.	490	40	35	94	6	665	NA	0

* – does not include cars, a – includes pick-up trucks, b – includes light trucks and vans, c – marketing dept only, d – does not include light duty pick-up trucks, NA – not available

FEDERAL GOVERNMENT*	Trucks & Tractors	Cars & Station Wagons	Ambulances	Buses	Total Vehicles
US Postal Service	134,338	9531	0	14	143,883
General Services Administration (a)	44,407	53,432	234	2840	100,858
Air Force	46,300	5908	1645	2440	56,293
Army	34,147	9407	1108	2770	47,432
Agriculture Department	27,169	3937	1	43	31,150
Navy	25,029	3213	684	972	29,898
Justice Department	4308	12,706	10	137	17,161
Interior Department	12,574	1666	11	109	14,360
Department of Energy	9240	1913	54	263	11,470
Treasury Department	1419	7943	0	13	9375
Marine Corps	5999	700	0	326	7025
Civil Works, Corps of Engineers	5894	838	1	19	6752
Tennessee Valley Authority	2281	1495	11	0	3787
State Department	1825	1122	11	0	2958
Labor Department	1205	328	12	34	1579
National Aeronautics & Space Admin	987	157	13	11	1168

a – most vehicles are in Interagency Motor Pool and rented or leased to other government fleets. There is no duplication with other fleets listed. * – Source: General Services Administration Report, printed 1989

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CHILTON'S SEPTEMBER 1989

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HOW TO BURY YOUR UNDERGROUND TANK PROBLEMS

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Product Evaluation: Nissan's UD 2800

Synthetic Lubes: A Slick Way To Lower Costs

CHILTON'S
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COMMERCIAL CARRIER JOURNAL

VOLUME 146 NUMBER 9 SEPTEMBER 1989

TABLE OF CONTENTS

FEATURES	HOW TO BURY YOUR UNDERGROUND TANK PROBLEMS...MAYBE! Above ground storage gains acceptability among states	48
	SYNTHETIC LUBES: ARE THEY WORTH THE COST? A technical cost analysis of synlubes vs traditional	56
	PRODUCT EVALUATION: UD MODEL 2800 A medium-duty truck with heavy-duty attention to detail	60
COLUMNS	Editorial / If you think deregulation was bad...	9
	Washington Report / ATA to profit from drug tests	37
	Business Side / What's so good about see-through roof?	39
	Safety / Shedding light on motor vehicle identification	43
	Maintenance/Technology / Navistar smokeless diesel	67
DEPARTMENTS	Up Front	16
	Truck Talk	12
	Industry Watch	18
	Classified Advertising	95
	Advertisers' Index	99
	SideRoads	100
PRODUCTS	New Product And Services	75
	Publications	94
POSTCARDS	Reader Service Cards	85
	Subscription Cards	87

Page 48

Page 56

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THEY COULD MAKE 'EM DANCE

That was the impression left with movie makers working on the new James Bond movie "License to Kill," for which Kenworth Truck Co. engineers were asked to do some special engineering on a few trucks to be used in the movie's stunt scenes. This picture is one of two we thought you would enjoy. Our favorite can be found in *SideRoads* on the last page of this issue.

One stop shopping...

...is what the CCJ October Buyer's Guide offers through annually updated listings of thousands of suppliers of commercial vehicle products and services. The issue also provides a couple of dozen pages on light, medium and heavy-duty truck makes and models and major component specs. It's a valuable reference tool to use all year. □

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Navistar's Smokeless Diesel beats '94 emissions

By PAUL RICHARDS Technical Editor 215-964-4519

Navistar International Transportation Corp., Chicago, provided a peek at the technology it will use to meet stringent federal standards for exhaust emission levels, scheduled to take effect in 1994.

According to Navistar, the International 94 Smokeless Diesel puts out a mere .08 grams per horsepower-hour of particulate matter, beating the 1994 emission standard of .10 g/bhp-hr. The engine's emissions are also well below 1994 standards for hydrocarbons (HC), oxides of nitrogen (NOx) and carbon monoxide (CO). In addition, Navistar claims the engine will produce lower emission levels than methanol or gasoline fueled engines of comparable horsepower—in all emission categories.

This is especially significant, since there has been widespread concern among diesel engine makers as to whether the 1994 standards can be met. Beating the standards by five years is a pretty slick trick.

A prototype of the 94 Smokeless Diesel was unveiled in July at the International Trucking Show, Anaheim, Calif., and drew lots of attention. Based on Navistar's DT 466, 210-hp engine, the 94 uses ultra-high injection pressures, a revised combustion chamber and catalytic converters to achieve its low emission levels.

To prevent plugging of the catalytic converters, low-sulfur (.05%) fuel must be used in the 94. But this shouldn't be a problem, since such fuel is expected to be widely available about a year before the engine goes to market in 1994.

One struggle faced by engineers in search of lower emissions is the trade-off between oxides of nitrogen and particulates. Invariably, when you lower one, you raise the other. For instance, one way to lower NOx is to retard the injection timing, which lowers the combustion temperature. But, since the fuel is not burned as efficiently, the result is more particulates. The 94 is both turbocharged and air-to-air aftercooled. Aftercooling, say Navistar engineers, reduces NOx, without sacrificing combustion efficiency.

The 94's pistons and rings were designed for maximum air utilization and minimum oil consumption. In addition, there is what Navistar calls a re-entrant chamber at the top of each piston that provides more efficient mixing of air and fuel. These features were designed to help lower carbon black in particulate emissions.

High-pressure fuel injection on the 94 prototype is accomplished by means of a pump-and-line system. The rate of injection is mechanically controlled, although the pump is electronically governed.

For the production 94 engine, electronically-controlled unit injectors, like those used in Detroit Diesel DDEC-equipped engines and Caterpillar's new 3176 engine, will be used. Unit injectors will be supplied by Caterpillar.

Another difference between 94 prototype and production engines is that the prototype uses two catalytic converters—production engines will use only one. Between now and the engine's scheduled introduction, a large part of Navistar's development work will involve field testing that converter. By law, the converter must be capable of going 150,000 miles without a failure. So far, durability has only been demonstrated to 50,000 miles.

But Navistar officials are confident they'll meet their goals. "We believe we can achieve an additional 25% reduction on NOx," said John Horne, vice president and general manager of Navistar's Engine and Foundry Div. "We believe we can do it without significant cost increases, major fuel economy penalties or further changes in fuels. □

	Emission Levels		1994 Model Year Emissions Standards g/bhp-hr			
POLLUTANT	Navistar Diesel Prototype g/bhp-hr Performance	Methanol Prototype g/bhp-hr Performance	Heavy-duty Diesel	Heavy-duty Methanol	Light-Duty Gasoline	Heavy-Duty Gasoline
Particulate Matter	0.08	0.12	0.10	0.10	None	None
HC	0.30	1.6	1.3	1.3	1.1	1.9
NOx	4.44	3.60	5.0	5.0	5.0	5.0
CO	1.37	6.4	15.5	15.5	14.4	37.1
Formaldehyde	0.047	0.16	NR	0.5		

Emission levels for Navistar 94 Smokeless Diesel not only beat 1994 standards for diesels, but for gasoline and methanol as well.